GRINDING and FINISHING

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AUGUST · 1960

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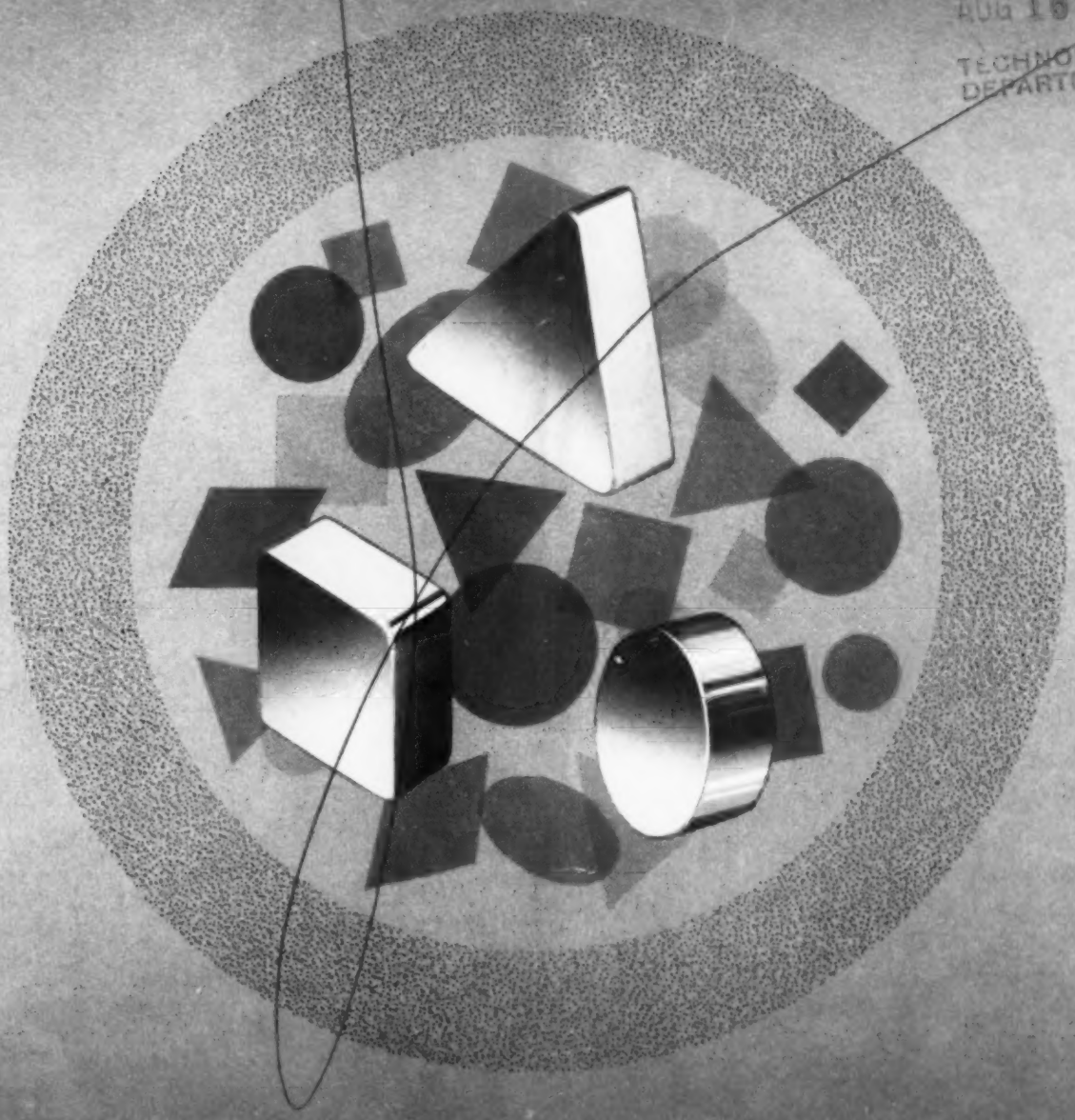

Carbide Inserts Foster Unique Grinding Operations—pg. 26

ALSO IN THIS ISSUE:

Russian Research Super Finishing Copper Cylinders—pg. 28
Quality by Coated Finishing Crankshafts—pg. 30

IT WILL PAY YOU

TO MAKE THE MACKLIN FIELD ENGINEER A PART OF YOUR PRODUCTION TEAM!

Today, automated high speed grinding of new and improved metals . . . the exact dimensional tolerances and high finishes required . . . all call for quality wheels built for the requirements of the job.

That's why it pays to consult your MACKLIN representative. He offers a complete line of "Wheels of Profit" for industry . . . wheels designed to meet the exacting needs of modern production.

If you are wondering how MACKLIN can improve your grinding production, here's a suggestion. Contact your local Macklin distributor, or call us for the services of a field engineer. We'll be glad to prove in your own plant why it pays to use Macklin "Wheels of Profit" on all your grinding work.

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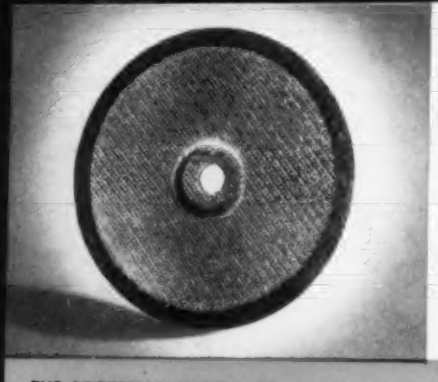
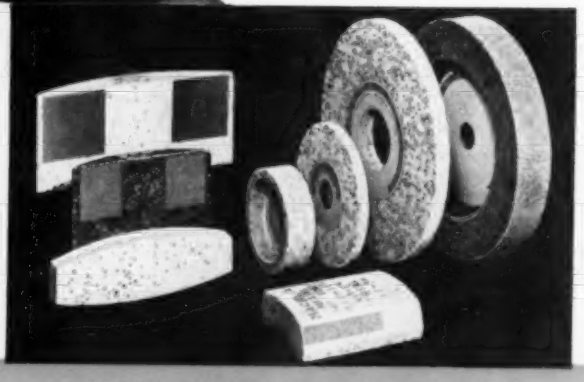
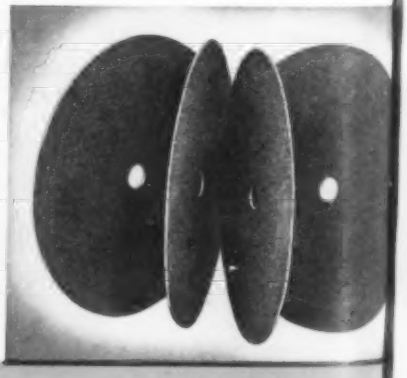


THE SCOTSMAN WHEEL—Gives superior performance on heavy weld grinding, notching castings, and smoothing flame-cut edges.



MACKLIN SEGMENTS (and tool room wheels). Segments fit any standard chuck. Give fast cutting with no checking . . . no burring.



MACKLIN CUT-OFF WHEELS Resinoid bonded for safe, cool, high-speed cutting.

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MACKLIN company

Dept. O, Jackson, Michigan
Phone: STate 4-6161

Manufacturers of a complete line of abrasive products

- Surface grinding wheels
- Foundry wheels
- Cylindrical grinding wheels
- Cylinder wheels
- Tool room wheels
- Disc wheels

WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

GRINDING and FINISHING

CONTENTS FOR AUGUST • 1960 • Vol. 6 • No. 8

Feature Articles

22 New Techniques Keep Jets Flying

United Airlines employs a new large machine in order to handle maintenance of work up to 52" in diameter by 48" high while reducing the number of machines required.

26 Carbide Inserts Foster Unique Grinding Operations

Management at Vascoloy-Ramet have developed their insert manufacturing to the highest degree. This close scrutiny has resulted in the application of excellent grinding operations.

By M. M. Patterson.

28 Russian Research Super Finishing Copper Cylinders

Leading Russian trade journal releases information which indicates their interests in abrasives and also their relative progress.

By A. J. Steiger

30 Quality by Coated Finishing Crankshafts

Quality of the bearing surfaces of crankshafts is extremely important to the automotive manufacturer. Coated abrasive finishing of these areas answers the needs.

By A. John Kirsch.

37 Adjustable Center Reduces Setup Time

A new adjustable center greatly reduces setup and scrap loss. Small tapers or taper corrections can be made easily.
Special to GRINDING and FINISHING.

Departments

4 Editor's Mail
11 Editor's Page
16 Sam Safety
19 Ideas from the Shop
21 Abrasive Engineer's Corner
39 American Society for Abrasives
41 Literature
45 Equipment and Materials
57 News of the Industry
67 A Final Thought

August Cover: Our artist has presented a number of carbide insert shapes along with photos of three basic inserts all within an abrasive wheel which represents the grinding operations required for all the machining operations.

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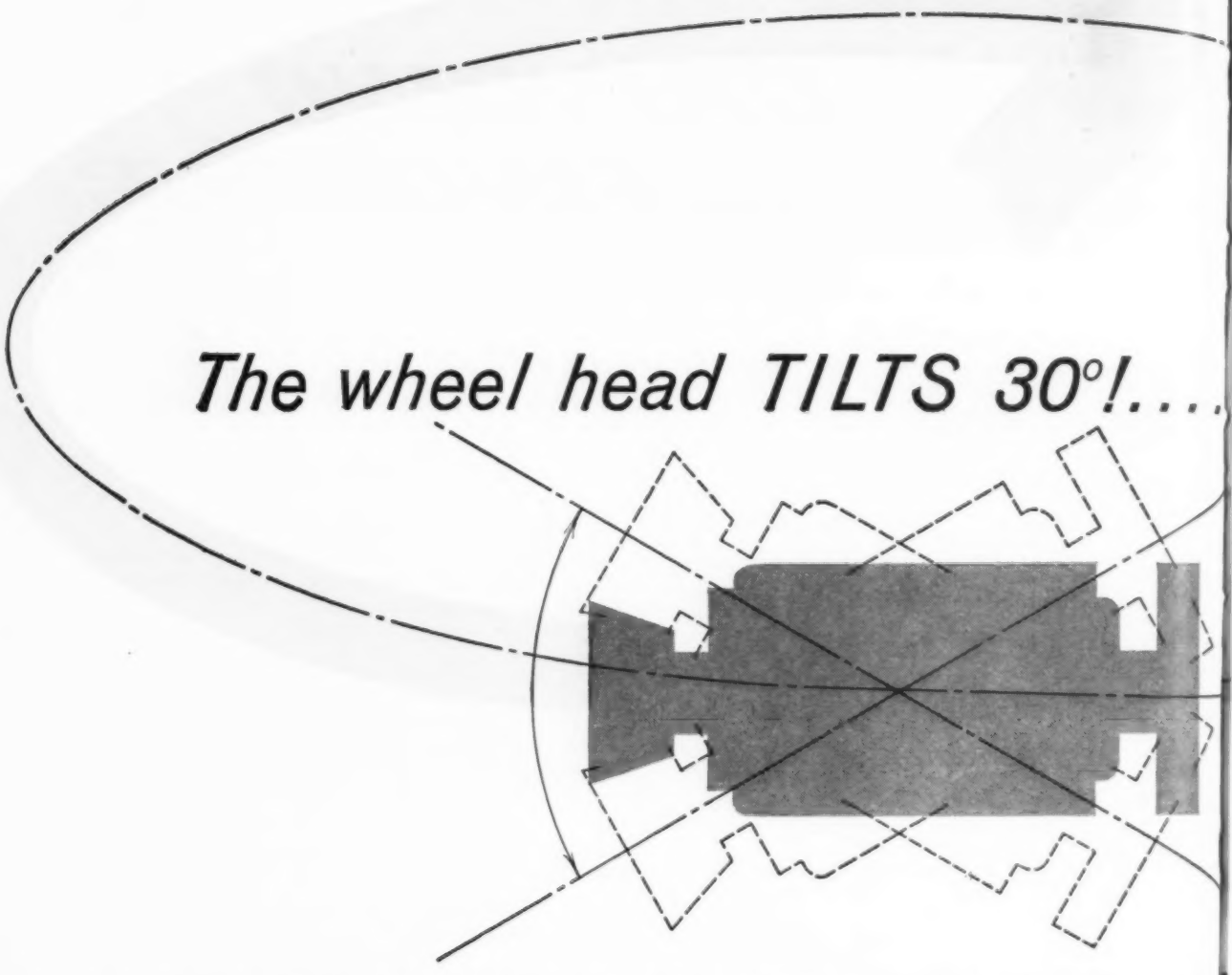
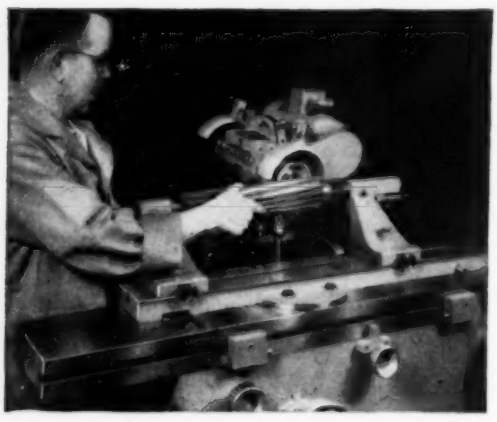
The wheel head TILTS 30°!...



The NEW NORTON No. 200 Cutter and Tool Grinder makes setups simpler . . . easier . . . quicker!



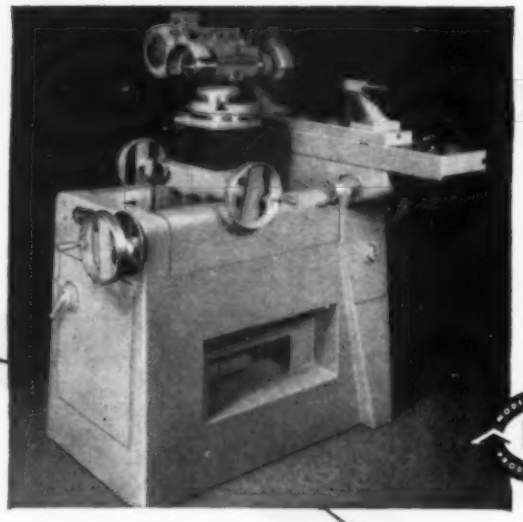
Tool room men can tell you that grinding a taper reamer is one of their toughest jobs. But now they're discovering that it and other tough tool grinding jobs are a "snap" with the new Norton No. 200. Because:

You can tilt the wheel head up to 15° above or below horizontal — and swivel it through a full orbit of 360°.

And the table has a very rugged, extremely accurate guide bar, which assures precision in tracking, during the most difficult grinding jobs.

All this means no more time-wasting "cut and try" tactics . . . no more wrestling with tricky setups . . . a wheel head scale provides quick direct readings of clearance angles . . . for practically all grinding on centers, the

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



MMT-PE

...ORBITS 360°!

VISIT BOOTH #651
Machine Tool Exposition • 1960
INTERNATIONAL AMPITHEATRE
Chicago — September 6-16

tooth rest can be kept on the center-line of the cutter, eliminating time losses from additional settings . . . the table design enables use of gage blocks for quick taper grinding setups and fast return of table to straight setting . . . greater wheel head capacity through eccentric mounting simplifies approach to many special jobs.

In addition:

The No. 200's extremely solid grinding action brings you excellent finish on tool cutting edges, with resulting benefits in tool life and performance. That's because the No. 200 is a wheel slide type machine, where grinding is always within the area of the rigid base, with no instability due to work overhang. Other advanced features include: quick-change two-speed wheel drive; centrally located column controls, wheel slide dials readable from any position.

Your Norton Man, a trained grinding engineer, will be glad to show you how the new Norton No. 200 cutter and tool grinder can help you modernize and economize in your plant. For catalog #1371, write to NORTON COMPANY, Machine Division, Worcester 6, Mass. *District Offices:* Worcester, Hartford, Cleveland, Chicago, Detroit. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

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...it's costly

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This system eliminates "fishing" and **warrantees** top cutting efficiency. We'll show you the ultimate production Diamond Wheel grinding.

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Editor's Mail

"NOAH KNEW A THING OR TWO"

Someone once wrote that the progress of civilization runs parallel to how closely man can measure. If we reflect on this for a moment or two, we see that these are not idle words.

We find in the sixth chapter of Genesis, starting with the 14th verse, that the Lord directed Noah, "Make thee an ark of gopher wood. . . . The length of the ark shall be 300 cubits, the breadth of it 50 cubits, and the height of it 30 cubits. . . ."

It was only natural that the earliest units of length, such as the cubit, were related to some part of the human body. The cubit was the distance from the end of the forefinger to the tip of the elbow.

We may think, in our smug modern society, that all this confusion dating back to before Noah was straightened out long before we first saw the light of day. Such is not the case.

Unnoticed in the newspapers by many, but indirectly of importance to all of us was the fact that as recently as July 1, 1959, the length of the United States inch was officially changed.

Up until that date there had been three different inches in use in the world, and to have for the first time a single, uniform inch to be used by all English-speaking countries, the appropriately named International Inch was adopted.

To make the change, it was necessary for us to shorten our inch by about 2 millionths of an inch, while the British Commonwealth, except for Canada, which had already made the change, increased its inch by almost two millionths.

These differences are small indeed, and until recently might well have been left alone. Certainly they need be of no concern to the buyer of a pair of shoes or a yard of cloth, but in the making of scientific and industrial instruments, guided missiles, and space rockets, the differences between the inches were greater than the required accuracy of the standards that helped to make them.

It would not be right to say that the parts that go into a guided missile are accurate to a millionth of an inch—not quite right, that is. But there are certain parts that must be accurate to five or ten millionths of an inch. These parts must be measured with a gage of some sort, and there is an old axiom of the gage maker that says the gage should be at least ten times more accurate than the part it is to measure. This means, then, that the gages must be accurate to one millionth of an inch or less.

One of the greatest milestones in industrial history was passed when Eli Whitney conceived the idea of making parts so near alike that they would all be interchangeable. He got the chance to prove his idea by winning a contract from the United States government for "a stand of 15,000 muskets."

Whitney's idea worked, for the muskets went together, although somewhat loosely, and mass production was born.

There was only one trouble. Another Yankee by the name of Smith made a few hundred muskets to the same dimensions used by Whitney. The parts made by Smith were also interchangeable among themselves but Smith's parts wouldn't fit Whitney's guns, and Whitney's parts wouldn't fit Smith's guns.

The reason was, of course, that Mr. Smith's inch was not the same as Mr. Whitney's inch. . . .

The actual length of the inch wasn't established until 1893, when it was defined by referring it to a certain fraction of the International Meter.

Meanwhile, the young Pratt & Whitney Company . . . built the now famous Rogers-Bond comparator, finished in 1882, which made possible for the first time the direct comparison of length standards to an unheard of degree of precision.

Pratt & Whitney gage blocks, developed shortly after World War I, . . . made available to the makers of almost everything manufactured an accuracy approaching the ultimate in precision. . . . Starting in 1957, Pratt & Whitney had the distinction of participating in a project aimed at pushing the frontier of precise measurement still further: to one tenth of one millionth of an inch.

A tenth of a millionth of an inch is hard for any one to imagine, but it is about the thickness of one sheet of newspaper sliced into thirty thousand sheets.

To go the other way, ten million sheets of newspaper, all stacked in one Sunday edition, would be a monument two and one half times the height of the Empire State Building. A tenth of a millionth of an inch is small indeed.

Pratt & Whitney is proud to have played such a major part in the development of the science of measurement. . . .

We have come a long way from the day of Noah's cubit but there are yet unconquered objectives ahead that demand our continuing study and research.

(Excerpts from a speech prepared by Albert M. Dexter, Director of Meteorology, Pratt & Whitney, for the company's Centennial, 1890-1960.)

We're not just saying our grinding wheels work better...

We can prove it!

When trial tests are run on Cortland Grinding Wheels in a customer's plant, our salesman is required to fill out report sheets. Those reproduced here are actual reports (with customer's and competitor's names withheld) of such tests.

But don't take our word for it. Let's get together for a trial run in your plant. We're confident that our grinding wheels will *prove themselves.*

Cortland Grinding Wheels Corporation

Report of Successful Trial

Date 4/6/60

Type of Grinding Snagging

Material Ground Annealed Malleable Iron Castings

Grinding Machine Own make-some double end and some single end floor stand grinders

Wheel Size 24 x 2 x 8

Grade and Grade Specification BA146-P-5BC4 Oxaluma Resinoid

Order No. 60-508 Salesman Cook

Competitive Product xxxxxxxxxxxxxxxxxxx

Test Conducted at:

Name xxxxxxxxxxxxxxxx

Address xxxxxxxxxxxx

Condensed Description of Grinding Operation Grinding gates and risers on general run of castings. Note wheel speed 930 RPM (5850 SFPM)*

Report Very satisfactory. 13.2 hours life vs. 12 for competition. Reordered.

*This is a slow speed which would normally take a vitrified bonded wheel.

Cortland Grinding Wheels Corporation

Report of Successful Trial

Date 6/9/60

Type of Grinding Cylindrical (Roll Grind)

Material Ground Forged and Cast Steel (hard) Rolls up to 54" dia.x 90" lg.

Grinding Machine Mesta- variable speed 600-1200 RPM

Wheel Size 30 x 4 x 15

Grade and Grade Specification FA367-N-7BQ60 Oxal. Res.

Order No. 60-1776 Salesman E. L. Whitney

Competitive Product xxxxxxxxxxxxxxxxxx

Test Conducted at:

Name xxxxxxxxxxxxxxxx

Address xxxxxxxxxxxx

Condensed Description of Grinding Operation Regrind- Removing .035 to .045 stock. Using sol. oil solution for coolant.

Report Very good. 10 trial wheels ave'd 2799 cu. in. stock removal per wheel vs. ave. of 2224 for last 13 competitive wheels run.

CORTLAND GRINDING WHEELS CORPORATION

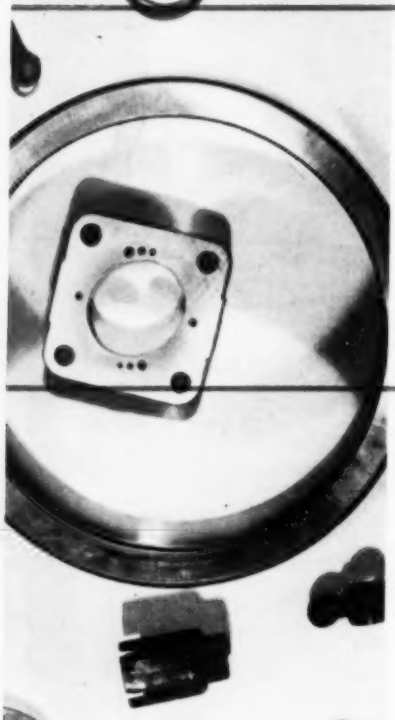
Chester, Massachusetts

CORTLAND

Use postpaid card. Circle No. 206

The BRYANT exhibit

If high-production, low-cost internal grinding is an important factor in your manufacturing operation, don't miss Bryant Booth #936. You'll see grinding done at eye-opening production rates by these advanced-design Bryant machines.



Bryant
UNIVERSAL Internal Grinder

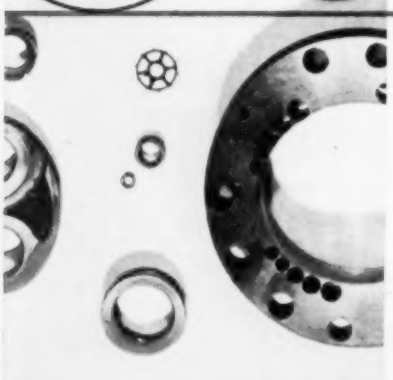
A *completely new*, low-cost, general purpose machine for I.D., O.D., internal face and rotary grinding. Incorporates many plus values not found in other low-cost machines.

Bryant MODEL "B"
MINIATURE CENTALIGN®

Miniature Centaligns will demonstrate the grinding of minute bores and raceways in miniature bearing races. The Model "B" is a truly miniaturized machine, offering such noteworthy features as Bryant's production-proven disc drive workhead, quick-change "packaged tooling", and "New Wheel Dress" mechanism.

Bryant VERTICAL CAM Grinder

This vertically constructed machine greatly multiplies the production of contoured bores. The operation of the eccentric workholding fixtures in a horizontal plane increases production, loads faster and easier. This grinder is of Centalign unit type construction, requiring a minimum of floor space. The high-production grinding of contoured bores will be demonstrated.



Bryant MODEL "C" CENTALIGN®

The standard for dependability, speed and accuracy in the world's major production lines. Featuring the exclusive Centalign wheelslide construction, cycle control by programming cams, and time-saving, split-second work handling.

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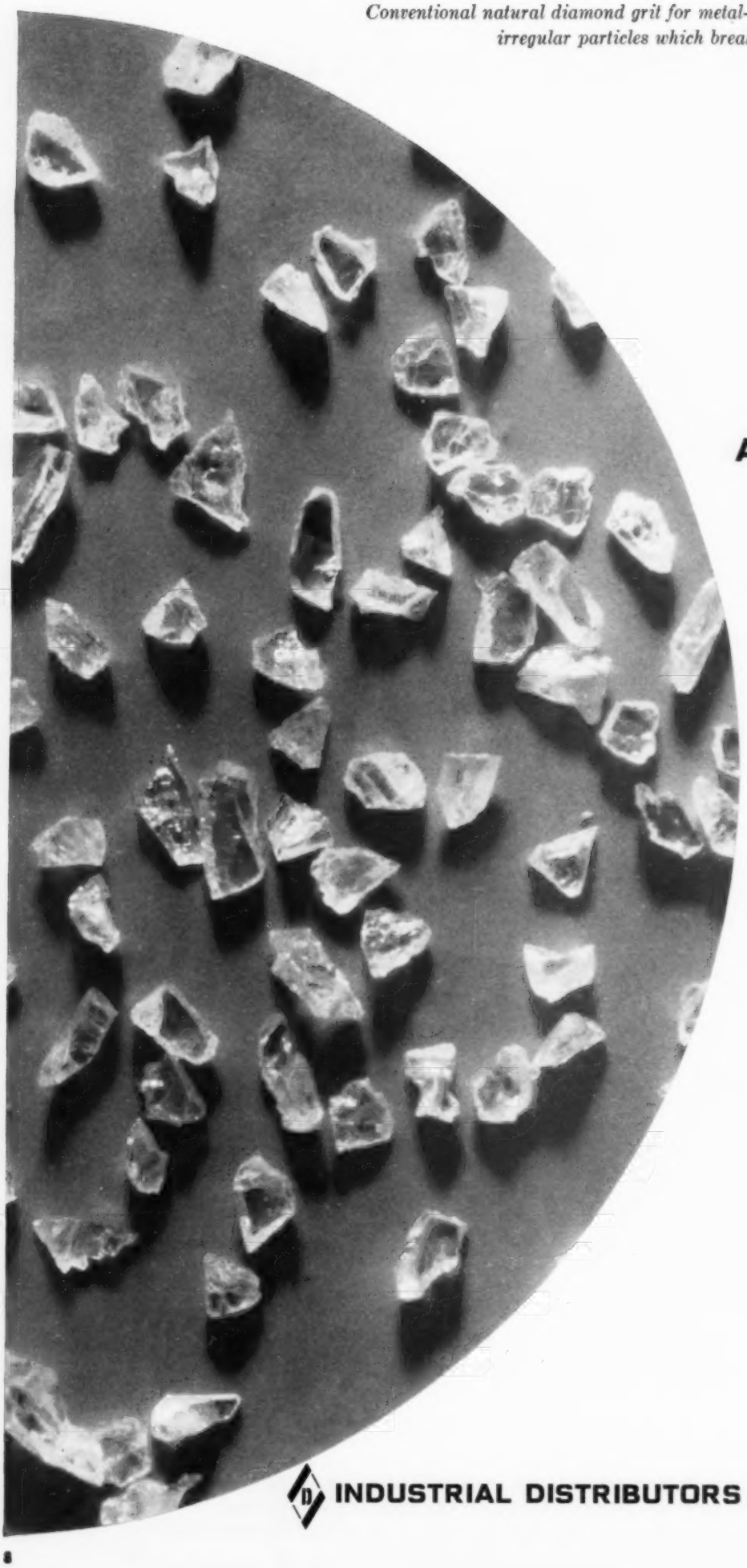
Conventional natural diamond grit for metal-bond wheels and saws. Note the friab irregular particles which break down under heavy pressure grindin



ANNOUNCEMENT:

NEW

NATURAL

DIAMOND GRIT

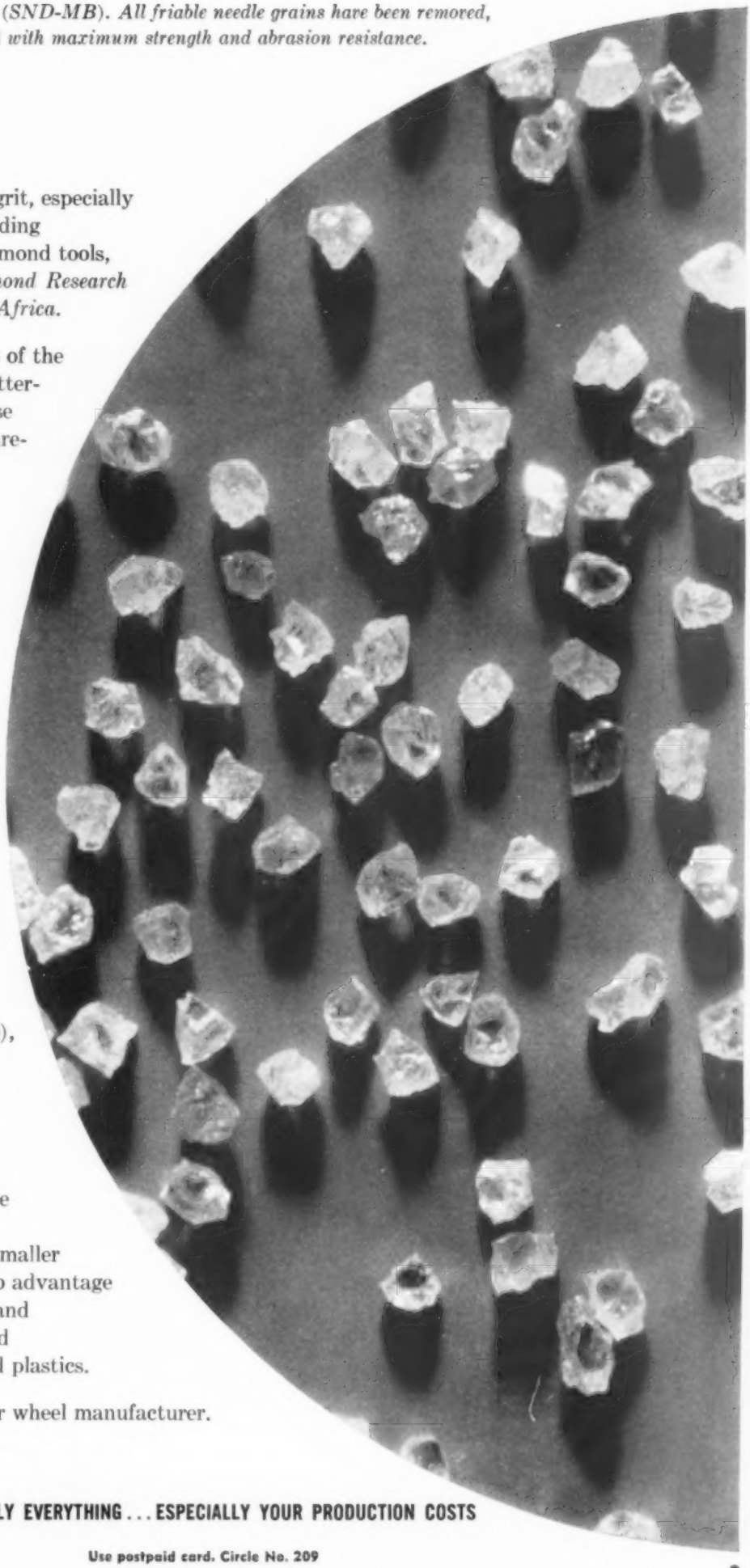
FOR

METAL-BOND

WHEELS

INDUSTRIAL DISTRIBUTORS (SALES), LTD., *London*

New Selected Natural Diamond Grit (SND-MB). All friable needle grains have been removed, leaving only the blocky, cube-like grit with maximum strength and abrasion resistance.



A new type of natural diamond grit, especially suited for use in metal-bond grinding wheels and other metal-bond diamond tools, has been developed at the *Diamond Research Laboratory, Johannesburg, South Africa.*

This new natural grit is made up of the strongest, most abrasion and shatter-resistant diamond particles for use in metal matrixes. A new pressure-testing and selecting process removes friable particles from the grit. Thus, the inherent strength of the natural diamond particle is ideally presented for the heavy-duty cutting done with metal-bond wheels and saws.

The new grit has been found stronger than any diamond grit available to date. In tests with concrete, marble, and tile, the new grit permitted a 30 to 50 per cent faster cutting rate than was previously possible. Further tests are under way in actual production set-ups.

Known as SND-MB (SELECTED NATURAL DIAMOND-METAL BOND), the new grit will be offered in a production range of mesh sizes from Tyler screen 16 to 325 mesh at present. The larger sizes will be used in metal-bond saws and thin-wall core drills, which are used in cutting concrete, stone and other rugged materials. The smaller cube-like diamonds will be used to advantage in metal-bond wheels for cutting and grinding of materials like glass and ultra-hard ceramics and reinforced plastics.

SND-MB is now available to your wheel manufacturer. Ask him about it.

INDUSTRIAL DIAMONDS CUT PRACTICALLY EVERYTHING . . . ESPECIALLY YOUR PRODUCTION COSTS

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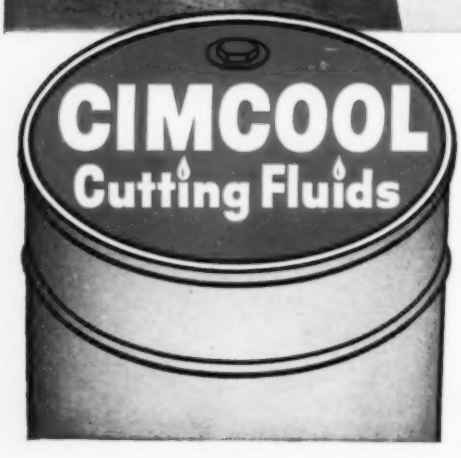
"Rust Completely Under Control!"

CIMPLUS, rust-control specialist of the famous CIMCOOL family of cutting fluids, cuts special handling costs by more than $90 a week. (Company name on request).

2
SALES REPORT
firm makes textile machinery. They were having trouble grinding some cast iron and shell molded parts. Extremely high stock removal, using a soluble oil coolant.
They were experiencing (1) Considerable rancidity... (2) Unsatisfactory settling of grit and sludge...(3) Parts were rusting so badly that they needed special handling. They were dried in sawdust. Rust had to be sandblasted or worn off in tumbling machines.
We installed Cimplus at 1:75. Rancidity—Now no problem. Grit settling—Excellent. Rust—Completely under control, with no special handling needed. Cimplus is saving them better than $90 a week in labor costs alone!
George Stockwell
Boston Office
VIA AIR MAIL
BOSTON
1961
MASS



FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL 52 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.

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WHEREVER ABRASIVE OPERATIONS ARE PERFORMED

Editor's Page

AUGUST, 1960

"Sam Safety" Is for You

You and your associates have often commented on safety. It is a subject that is very close to everyone. So along these lines we have written many articles on the subject and some time ago started a cartoon character called "Sam Safety". Many of you have been very kind in your remarks concerning our safety presentations; therefore we want to make every effort to provide you and your associates with as much help as we can.

"Sam Safety" is again in the picture because it is through "Sam" that we would like to be of service in your safety efforts. In this issue "Sam" is appearing for the twelfth time. This, we hope, means to you that there are twelve posters available which can be placed in your grinding areas. These posters are specifically designed for grinding alone and therefore hit at specific grinding safety problems.

For some time we have made note of "Sam's" availability under the cartoon and have offered him in the Literature section, item No. 100. It is our belief that anything dealing with the safety of others should not be left to merely normal action; therefore, we are taking this column to emphasize the availability of "Sam."

You have many ways in which "Sam" can be used. It may be that he can be included in your present safety campaign. It can be used as a campaign in itself. ("Sam" will be a new cartoon in every issue as long as the ideas last.) You may have a safety man in your plant, in which case you need only call his attention to "Sam". He could be bound into a volume and used in training courses for apprentices. The use is, of course, up to you and your associates.

The single salient point we wish to make is that safety is for everyone and must be by everyone. There is available a means by which safety can be helped. If "Sam" can prevent one careless act and thus save one person from an accident he has been well spent.

A sample set of the "Sams" now printed on heavy stock is available by writing Sam, c/o GRINDING and FINISHING, Wheaton, Illinois.

W. W. Patterson

Managing Editor

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Gordon Lund

Purchasing Agent Harold Hammel discusses quality of finished cut on stainless bar stock with Bay State's Gordon Lund.

Cost is a vital consideration in the manufacturing of components for modern steam power and heating installations. And one of the largest and most successful manufacturers in this field is the Sarco Company, Inc., of Bethlehem, Pa. Their Thermo-Dynamic steam traps are famous wherever steam is used for heating or power.

The problem at Sarco was to cut square and octagon bar stock to size for the trap and keeping costs down was vitally important. At the direction of Sarco Purchasing Agent Harold Hammel, tests were run on band and hack-saw cutting as well as on the best available abrasive cut-off wheels.

Bay State Abrasive Specialist Gordon Lund was asked to specify the wheel he figured would do the best job and results proved that he figured right. Not only were cut-off wheels in general 15-20% more economical than sawing but Bay State's resinoid bonded wheel beat other wheels by a substantial margin in time per cut and number of cuts per wheel.

Even more important than this, after the Bay State wheels had been in use for a period of time, Sarco rated them *tops for consistency*, too . . . another example of the way Bay State's relentless testing procedures pay off in wheels that give the same top performance wheel after wheel after wheel.

Like Gordon Lund, your own Bay State representative brings you the advantages of wide experience with grinding problems of all types . . . plus a complete line of high-performance abrasive products backed by research and test programs of unequalled effectiveness. *Better grinding at lower cost . . . that is our business.*

Bay State resinoid bonded wheel is shown cutting 420 Series stainless bar stock to meet requirements for maximum cuts per predetermined cutting cycle. (Guard raised for photography).

helped lower stainless cutting costs 15-20% at SARCO

Four years of bare-knuckles shop experience with a major automobile manufacturer plus six years experience as an Abrasive Specialist (both in-plant and in the field) give Gordon Lund an unusually broad knowledge of the metal-working industry in general and grinding techniques in particular.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

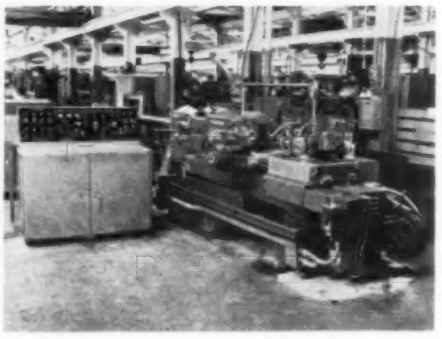
Use postpaid card. Circle No. 213

FOR IMMEDIATE RELEASE

Press Release from: JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U.S.A.

for all publications, on machines for N M T B A Exposition.

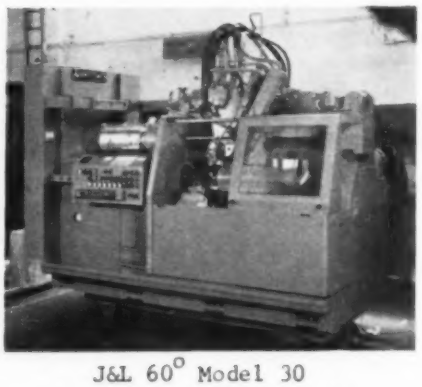
J&L's Booth #839 at the NMTBA Exposition in Chicago will include turret lathes ranging from a standard, manually-operated #3 Ram Type Turret Lathe up through an entirely new line of machines with automatic transmissions. Highlights of the J&L exhibit will be an all-new, completely automatic, electro-mechanical machine; and the world's first production model of the Jones & Lamson Numerically Controlled Turret Lathe. Machines will be in operation on actual production jobs.



J&L Numerical
Tape Control Turret Lathe

Among other production-proven turret lathe operations, you will see multiple tooling on a two-dimension turret lathe tracing unit, and the remarkable Jones & Lamson auto-threader, which provides completely automatic cycling for single-point thread chasing.

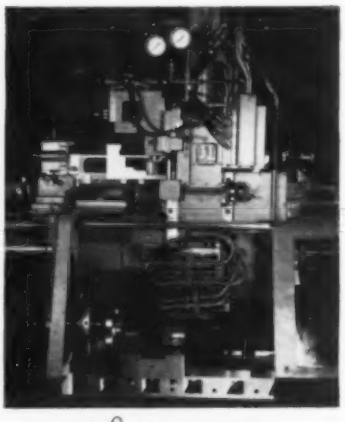
Moving on to other high production machines, Jones & Lamson will have in operation three different variations of the all-new family of Model 30 Single Spindle Automatic Turning and Tracing Lathes. The basic machine is of bridge-bed design for maximum rigidity, and offers extreme versatility of tool motion, ease of loading and unloading (manual or automatic), as well as ideal conditions for chip removal.



J&L 60° Model 30
Automatic Tracing Lathe

The three machines in operation will be set up as follows: One is a Multiple Slide Single Spindle Automatic (machining a production run of crankshafts). Another is a 60° Automatic Tracing Lathe (performing high-production work on steering knuckles). The third machine will demonstrate multiple tooling of Two-Dimensional Tracing on a series of different sized gear blanks.

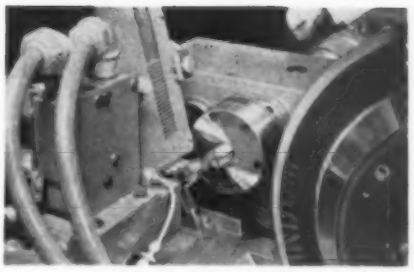
All of these machines feature a wide range of spindle speeds (up to 32), with automatic speed and feed change during a cut. A variety of components may be added to the base machine to meet specific requirements demanded by the individual customer's work. For instance, a rugged 6" hydraulic ram tailstock is mounted on the lower bed for between centers work. Multiple tooling may be applied to a rear forming slide, or a rear facing, forming and turning slide - also mounted on the lower bed. Two bevel facing, or necking slides (one light-duty, one heavy-duty) are available for mounting on the front side of the lower bed. The upper bed may carry a multiple-tooled turning slide, a 60° tracing slide, or a 180° (two-dimensional) tracing slide. The two-dimensional slide is hydraulically controlled, and may be multiple-tooled for tracing operations using any one of eight different tool travel cycles - each of which controls tool motions through a full 180° of travel.



180° 2D Tracing
on J&L Model 30 Lathe

Two different headstock transmissions are available (16 speed or 32 speed) as well as two different spindle noses (6" A-1 or 8" A-1). The machine comes in three standard bed lengths - 24", 48", or 72". Controls are unique, reliable and extremely accessible. On re-order, for instance, set-up is accomplished in a matter of minutes simply by setting the graduated dog rings on the conveniently located control drum.

The new Jones & Lamson automatic form grinders will stimulate some new thinking. Perpetual Form Control (PFC) with cemented diamond cutters will be employed to show the advantages of high production, close tolerance grinding - with no time out for wheel dressing. A new PFC dresser with up to 12" of width for CDP cutters is one of the features of the new "Model E-3".

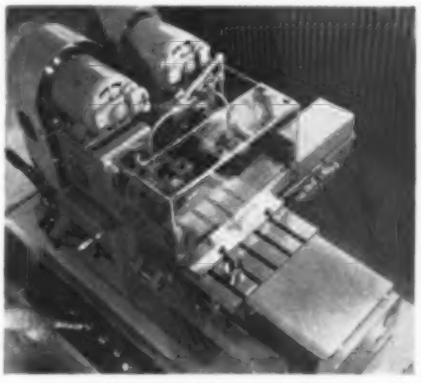


J&L Model F
Automatic Thread Grinder

Another machine being exhibited for the first time is the "Model F" Thread Grinding Machine, designed for high-production thread grinding of small parts. It is particularly applicable to thread grinding operations on all standard taps, with manual or automatic handling.

J&L will also introduce a brand-new, low-cost, small, Precision Thread Grinding Machine. Details of this machine are still considered as "classified", but will be released at show time. Watch for it. Originally it was to be designed specifically for satellite shops in the Electronics Industry, but its design has been amplified to include work performed in a larger segment of the metalworking industry.

The Precision Boring Machine is a relatively new member of the J&L line. It is low in price, but high in performance. Single or multiple spindle set-ups are available for close precision turning, boring, or facing operations. One of the demonstrations at the show (an actual production job) features the complete machining of both inside and outside surfaces of stainless steel cups in a single 20-second machining cycle.

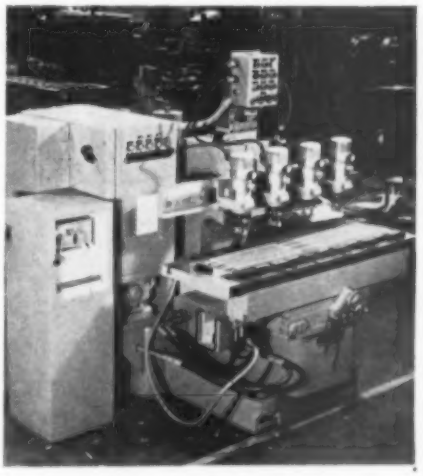


J&L Double Spindle
Precision Boring Machine

Another new machine being introduced will be the J&L Precision Deep Hole Drilling Machine. This one will be performing a gun drilling operation on a 3/16" diameter hole, three inches in length.

Representative models of the extensive line of Jones & Lamson Optical Comparators and Measuring Machines will also be in operation at the J&L Booth #839. These will vary from the new economy-sized Model TC-10 with a 10" screen, up to the largest capacity 30" screen models.

Among the many optical inspection methods shown working on typical jobs will be the relatively new High Intensity Reflection Unit; the unique Mercury Arc Unit, that provides five times more illumination than any single filament type bulb; a new light concentrator for special applications; and a host of other innovations, including standard and special staging fixtures.



J&L Tape Controlled
Positioning Table

J&L's 20" x 20" Positioning Table will also be in operation under one inch, 8 channel tape control, with electronic hydraulic servo control for end point positioning.

The Positioning Table will be set up in conjunction with a Standard Post Drill, to demonstrate the speed, accuracy, and minimum set-up time required with tape control on small or long-run production.

The famous "no approximations" Jones & Lamson thread tool line will also be on display. This line includes Automatic Opening Tangent and Radial Type Die Heads, Collapsible and Solid Adjustable Taps, and the time-saving Modern-Magic chucks and collets.

"The Man Who Needs a New Machine Tool Will Find it in Booth #839"

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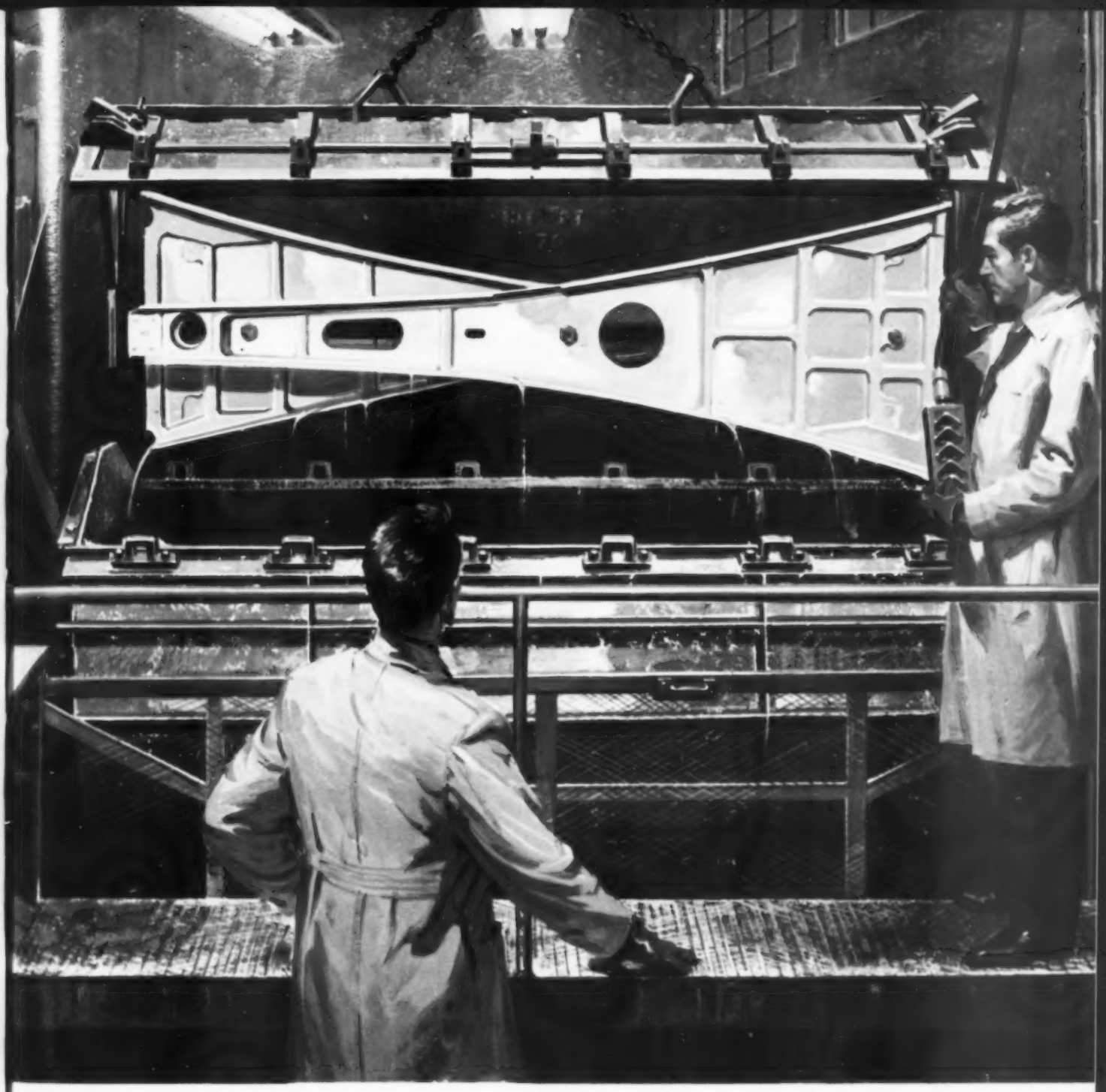
SAM SAFETY says:



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Here's what Link-Belt reports about the results they obtained from the use of U.S. 30" Wheels when grinding white iron castings in their Indianapolis plant.

- Wheels used under extreme pressure did not groove when removing small, narrow gates.
- Wheels were fast-cutting, yet did not burn or check the casting.
- Wheels were self-cleaning, so constant dressing was eliminated.
- Wheels proved so economical and practical for high-speed grinding that they justified investment in this type of equipment.
- Grinding wheels removed gates in one pass against the wheel.
- Workers were pleased with the wheel's efficiency and operation.

• • •

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Ideas from the Shop

Filing Machine Stones Cutting Tools

By H. J. Gerber

An oilstone fitted to a small bench die maker's filing machine can be used to finish the cutting edges of many types of lathe and planer cutting tools.

The stone is secured to a flat steel backing plate which is, in turn, gripped in the upper and lower jaws of the filer, just as a file would be held.

The oilstone in this set-up was held to its backing by the use of two button head machine screws at each end of the stone. This holding method is effective, but I believe the use of one of the new epoxy resin cements might be a neater and simpler means for securing the stone to the steel backing.

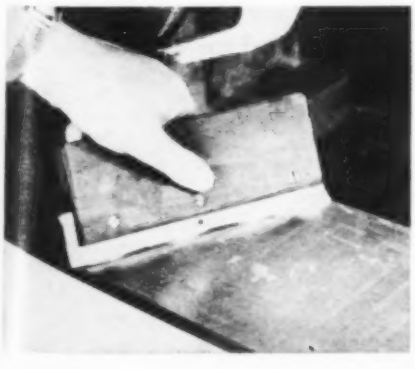
The tilting table of the machine may be set at the desired relief angle for the tool. It is suggested that oil or soluble oil mixture be applied liberally to prevent clogging of the stone.

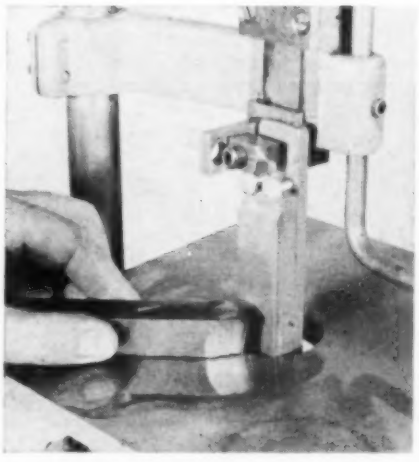
Teflon Tape For Chuck Cleaners

By H. J. Gerber

We have adopted the use of thin Teflon tape in the making of wipers for the magnetic chucks on our surface grinders.

Eight or ten layers of the tape are fitted into a slot in a wood handle, as illustrated, and retained in place by





several wood screws which draw the sides of the slot together tightly.

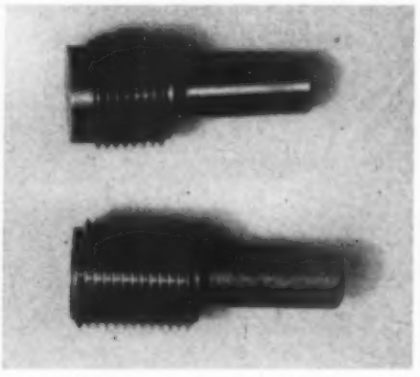
In past years we have tried several different materials for this purpose. Leather belting and oil resistant synthetic rubber work fairly well but neither is as durable as the Teflon material. I believe the many layers of thin tape do a better job also; this is probably because of the overlapping action of the many wiping edges.

"Great idea of yours, Miss Keyes, to put that abrasive paper on my desk."

Salvaging Thread Plug Gages

By H. J. Gerber

• I have found that the simplest method for extending the life of a "no-go" thread plug gage is to mount it between centers on the cylindrical grinder and remove the first two or three threads down to the root diameter. This method is effective because usually only these first few



Thread plug gage on the bottom has been ground to remove three worn threads. This practice is most effective on "no-go" gages.

threads are used when using this type of gage and the remaining threads are like new. This process may be repeated several times, each time grinding the threads farther back.

To some extent this method is also effective on "go" gages as they also are often used only on the first three or four threads. A pitch diameter test will indicate whether or not the "go" gage has enough unworn threads to warrant the use of this method. • • •

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Abrasive Engineer's Corner

ARTHUR RAKESTRAW • Contributing Editor

Grinding Ball Bearings

• What are some of the fundamental principles by which a roughly round rod is ground into a nearly perfect sphere for ball bearings?—J. D., Reading, Pennsylvania.

The question as stated is somewhat confusing in that it appears to intimate that round rods are ground into spheres to produce ball bearings.

This procedure is commonly used in the production of ground plastic balls. The abrasive wheel is mounted in a machine similar to a centerless grinder. A series of grooves half the diameter of the desired sphere is dressed into the wheel face. Rough spheres are produced by plunge grinding the plastic rods.

Were it possible to grind steel spheres by this method, the resultant ball would be worthless as a ball bearing, since the grain of the steel would run out of the piece, and cause the hardened finished ball to crack in half.

In the manufacture of steel balls, the rough spheres are formed either in an automatic heading machine, or are forged. Smaller balls are formed by the heading machine as coiled wire is fed into the machine, cut off to the required length and formed between two half spherical dies.

Headed or forged balls are then deburred, an operation which removes the flash (metal squeezed out when the two half dies meet and compress the ball.)

Rough grinding is then performed on a special vertical grinder consisting of a disc wheel at the bottom, an eccentric plate to confine the balls during grinding, and a pressure plate above. The rolling action of the balls as they are directed by the grooved eccentric plate across the face of the disc produces a rough sphere.

After hardening, they are finish ground in a similar fashion, using very hard fine-grit discs, with oil as a coolant. Subsequent finishing operations, including lapping between cast iron laps with very fine abrasive grain, complete the sizing of the product. Burnishing further refines the finish and brings out a high luster.

This procedure has been very roughly outlined and certainly does not do justice to the extreme care and precision required to produce even a commercial steel ball.

Apparently the fundamental principle involved in the rounding up of these rough spheres is the rolling, zig-zag, ever-changing axis of the rough sphere as it contacts the abrasive plane, which eventually resolves the piece into a near-perfect sphere.

"Cheap wheel. Always getting out-of-round."

Silicon Carbide Wheels for Roughing Carbide Tools

• For rough grinding carbide tools with silicon carbide, when should porous, semi-porous, or dense wheels be used?—G. Z., Philadelphia, Pennsylvania.

The more open, porous-structure silicon carbide abrasive wheels were primarily designed to reduce the amount of abrasive contact to the work and to produce cooler grinding on comparatively large carbide areas.

This type of wheel is most effective for grinding larger carbide inserts or in surfacing large areas.

Small carbide single-point tools, which present comparatively small areas of contact to the wheel, can be satisfactorily ground on the denser type wheel. In fact, the dense structure resists grooving of the wheel and usually proves to be more desirable.

In our opinion, the selection of the type of wheel—i. e., dense, semi-porous, or porous—depends largely on the size of the carbide area to be ground.

In the small shop where roughing operations on a wide variety of carbide tools are performed on a single grinder, it would not be practical to make frequent wheel changes to accommodate a few tools. In these shops, the type of wheel suited for the most difficult wheels would be the best choice.

Hardness in Metal Bonded Wheels

• How are degrees of hardness achieved in metal bonded diamond wheels?—M. M., Camden, New Jersey.

Of the three types of diamond wheels: vitrified, resinoid, and metal bonded, the latter two have virtually no porosity. Grade in vitrified diamond wheels, as in any standard vitrified product, is changed by varying the volume per cent of abrasive, bond, and pores. Grade variations in the earliest resinoid bonded diamond wheels were obtained by varying the baking temperatures. Manufacturers now vary the grade of these wheels by changes in bond mix.

Metal bonded diamond wheels are a product of powdered metallurgy, and grade variations are produced by varying the type of powdered metal. We understand that the softer bronzes are used to produce the softer grades, progressing through the harder bronze to steel for the hardest wheels. • • •

THE CORNER is a good place for your problems, comments, and experiences in abrasives and their uses. Send your questions or contributions to: A. S. Rakestraw, GRINDING and FINISHING, Wheaton, Ill.

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Hardened (63 Rockwell, C scale) high-speed steel tool bit, 4" x ½" x ½", was finish ground on four sides in a BESLY DH4 grinder at rate of 600 pieces per hour. Size was held to ±.001", parallelism (square across corners) to .001". Stock removed was .012 per side (.024 per pass). The tool bits distorted by heat treatment, are quickly trued up by the twin discs of the grinder.

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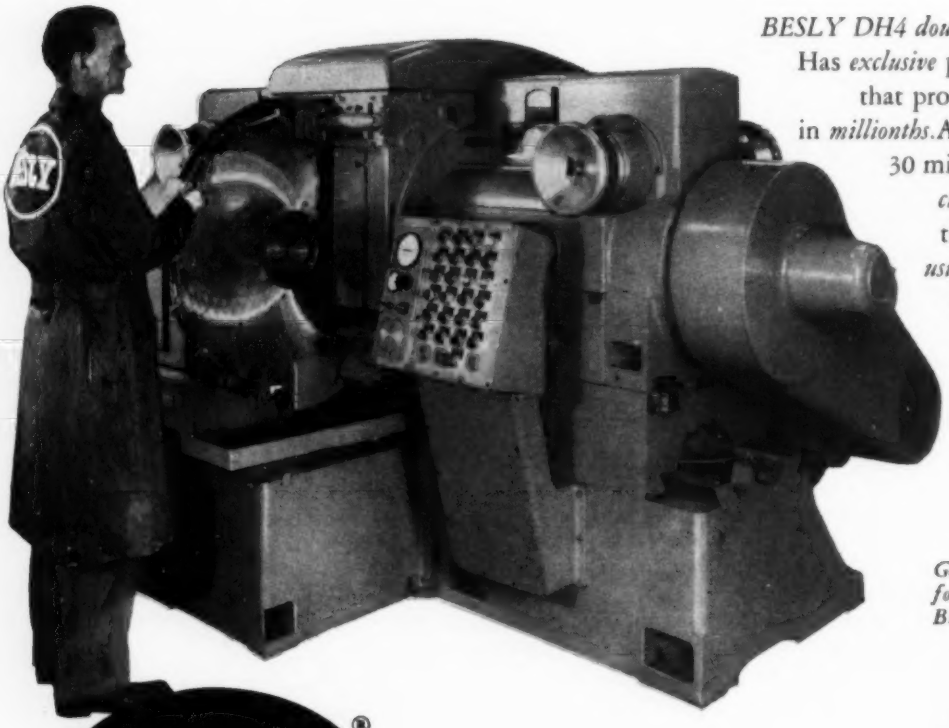

BESLY DH4 double horizontal spindle disc grinder. Has *exclusive* precision quill and clutch infeed that provides feed increments calibrated in *millionths.* Abrasive discs can be changed in 30 minutes without disturbing setup, *cutting downtime in half.* Dressing time is only four minutes, *⅕ the usual time!* Simplified push-button operation and controls, built-in dials, gages and meters to indicate abrasive conditions, movement and alignment; motor load, etc., assure precise results, dependable grinding production.

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Recent tests conducted on forged die steels proved standard V40 segments by Carborundum to be freer cutting and less costly to use than the nearest competitive type.

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Grinding B block die sets of uneven heights and with deep pits and heavy scale, the V40 segments outperformed competition by 35% based on overall operating costs. The V40 segments drew less power and ground cooler.

The rate of cut was 38% faster. Abrasive wear was 58% less. The V40 segments used in these tests were National Standards, available as 'shelf stock', by Carborundum.

Ask your Carborundum distributor about this *new evidence* on his next call.

This is a paid advertisement by The Carborundum Company, Niagara Falls, N. Y.

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New Techniques Keep Jets Flying

● Jet engine overhaul is getting a different look at the South San Francisco maintenance base of United Air Lines.

A new type of vertical machine capable of a variety of grinding and associated operations has come up as one of industry's answers to the demands of the jet age for the equivalent of "longer runways" in the maintenance shops.

Big enough to handle such large parts as turbine engine difuser cases, this Heald 578 vertical can accommodate work up to 52" in diameter and 48" high. It is versatile enough to handle such jobs as:

Grinding tips of rotor blades;

Turning and grinding stainless steel difuser case joints;

Grinding bearing seats on shafts and in rotor shaft bores;

Toolroom jobs such as grinding the planimeter rings for checking the shape of sheet metal sound suppressors, the holding fixtures used on the machine, and the tips of bushings in a ring jig for locating 80 ventilation holes inside the difuser casing.

United is said to be the first airline using this type of machine for these jobs.

For United, the 578 represents an answer to problems inherent in jet "remanufacture," which differ sharply from the difficulties of overhauling piston engines.

Size of the components alone calls for flexible equipment capable of handling a variety of operations with minimum set-ups. Commercial overhaul plants can't base their methods on military experience or on original engine manufacture because conditions just aren't the same.

Jet parts require a big machine (the 578 is 15′ high, 15′ wide, and 12′ deep) with great swing and travel, rigidity to handle big components and a light touch for smaller aircraft parts. Flexibility for working several types of metal on the same equipment demands great versatility in speeds, feeds and controls.

An alternate method of rebuilding might be the use of a vertical grinder or a gap type internal plus a lathe—both with horizontal spindles. Because the work must rotate, mechanical problems are encountered in mounting big parts on a horizontal machine.

When the engines that power the jet Mainliners enter the turbine overhaul and test section at

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United's 128-acre base they are stripped to individual components for preliminary cleaning. Big parts like difuser cases, for example, are suspended on an overhead conveyor system for the hours-long trip through various solvents. After inspection, these stainless steel cases move to the Heald machine for grinding and related operations.

Chrome plating levels the worn and pitted areas, after which grinding (at up to 6,000 sfpm) restores the part to dimension within the required tolerance of three "tenths" and 15 rms finish.

Difuser cases are held with four chuck jaws on the table. Rotor and stator rings are clamped on the table with hold-down clamps between sheets of ¼" thick rubber centered on a steel stud to prevent distortion during grinding. Carbide tools are held in the turret by ram type holders. Cimcool coolant is used, circulating at 20 gallons per minute at 30 psi.

In its class, this machine is said to be the most nearly universal machine tool ever built by Heald. Its ten-ton slide assembly incorporates both a metal cutting turret and a grinding head.

Table speeds range from 2½ to 180 rpm, and the slides reciprocate either automatically or manually at a rate of 0 to 10 fpm. Both the cutting and the grinding slides have 20" travel, and can swivel 45° to either side of vertical for angular operations.

Speeds and feeds, infinitely variable, can be remotely controlled from a pendant while the machine is operating. The control system is unique in that speeds are controlled hydraulically from a remote position by electrically actuated throttles. Electro-hydraulic reversal of the grinding slide is effected without clumsy mechanical linkages by transistorized proximity controls.

The transistorized control also serves to soften reversal strokes. A remote control dwell at either end of the grinding stroke allows slowly rotating large diameter work to be brought to size without secondary grinding. • • •

Grinding big stainless steel turbine difuser case at United Air Lines' new maintenance base in South San Francisco. This Heald model 578 vertical accommodates work up to 52" in diameter and 48" high.

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★ combination grinding and polishing wheels for the cutlery industry

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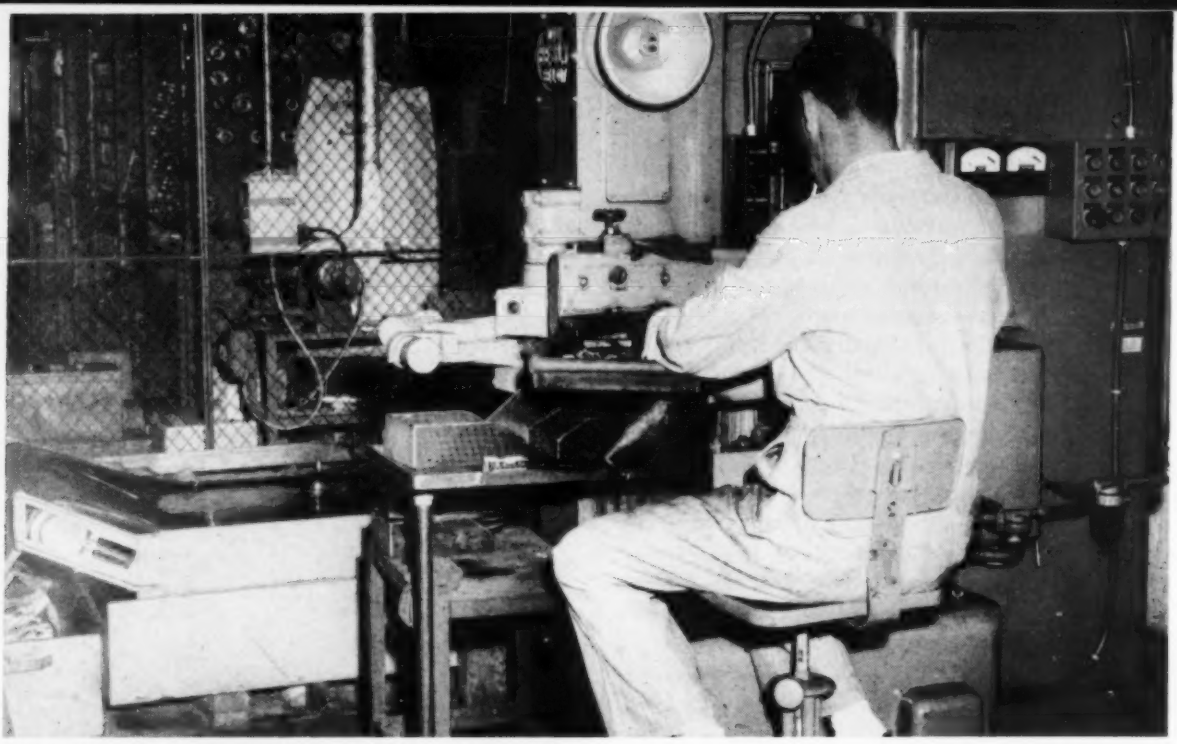


Shown here is the Besly-Welles DV-2 verticle spindle double disc grinder which operates at a speed of 13000 sfpm.

Carbide Inserts Foster Unique Grinding Operations

Production of cemented-carbide inserts by Vascoloy-Ramet Corporation requires grinding and finishing of all surfaces. Nature of the material and production requirements have demanded close evaluation of each operation and continuous search for new improved methods.

By M. M. PATTERSON
Managing Editor

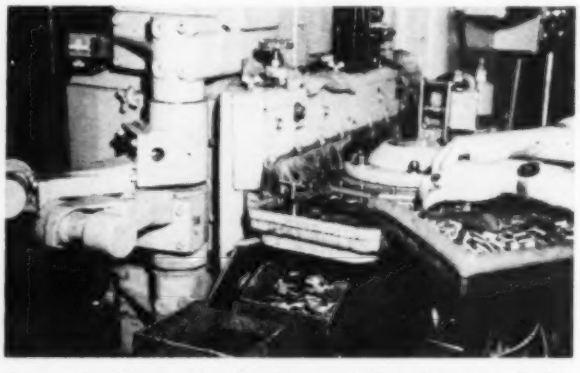
● At the Vascoloy-Ramet Corporation plant in Waukegan, Illinois, thousands of various types of cemented-carbide inserts are produced monthly. Production management of this company has therefore been extremely alert to improvements of present methods and the possibility of incorporating new processes. Contour grinding of the periphery of several inserts at a time in one set-up, and finish grinding of the faces by double discs at 13,000 sfpm are examples of the management alertness.

The rough blanks are received in the grinding department with finishing stock to be removed. The first operation is to grind the faces. This is then followed by grinding the periphery and finishing.

Grinding of the faces to finish size is performed on the newest and in our opinion the most interesting machine in the shop. This machine, a Besly-Welles DV2 vertical spindle double disc grinder, (GRINDING & FINISHING, June 1960) has ground the faces to the required tolerances while reducing the operational costs.

The tolerances are held within the standards of the code ASA B80. 1-1959, which are, thickness ±.005", faces flat and parallel within .001". at V-R a finish of 8 rms or less is held. Production is presently 2700 passes per hour, removing .003" per pass. Each insert makes three passes which brings it to the high side of the ± .005" tolerances

Metal bonded diamond wheels are used at a speed of 13,000 sfpm. The wheels are completely



Above is shown the loading of the fixture of the disc grinder. Note the dressers to the left which are mounted to each spindle.

enclosed with an average steel plate thickness of 5/16". This unusually high speed, plus an oscillation of the feed wheel, provides increased stock removal and grinding efficiency. The wheel is 14" in diameter, which must be held to +.000" and —.001" on the O.D. with a 1" face and 1/16" depth of 100 grit diamond. V-R has found that a coarser grit gave better finish when using the face of the wheel and the findings have held up with the Besly.

Fixturing or feed wheel on this machine is 30" in diameter. It is designed to pass the work only between the 1" face of the wheels. Rotating at 1.25 rpm, the feed wheel is designed with 36 work positioning holes. The positioning holes locate the inserts so that the last part of the insert to leave the wheels is of the largest area. This has been done to prevent the pinching action caused by the top spindle being canted about .004" in two directions.

Only the top wheel is fed to the work. An anti-backlash pressure of between 400 and 500 psi is maintained on the top wheel. Each wheel has a Norton brake type dresser mounted to the spindle assembly. In addition, the set-up includes a Delpark filter and a Lundholm Coolant Chiller. These two attachments keep the coolant clean and at a constant temperature.

As an indication of the progress by this management, the face grinding operation was ordinarily done by a surface grinder with the rough blanks placed in hot wax on a cast iron plate which was, in turn, cooled and located on a magnetic chuck. After the first side was ground, the inserts were turned over, again placed in wax, and the second face was ground. After grinding, there was always the problem of cleaning the wax from the inserts. The use of a double disc grinder has increased production by decreasing handling, eliminating one operation and the cleaning of the inserts.

The second operation is the grinding of the periphery. This operation is performed on a Throwaway Grinder by Harvill-Johnson Corp. This is a cam grinder in which several inserts are loaded by means of a loading and locating fixture which positions the inserts against the work spindle and in relation to the cam. A toggle clamp holds the inserts against the spindle while they rotate. The cam is to the left of the work spindle drive motor or on the opposite end double end shaft. As the work spindle rotates, the cam running against the follower forces the complete work spindle assembly to and from the grinding wheel.

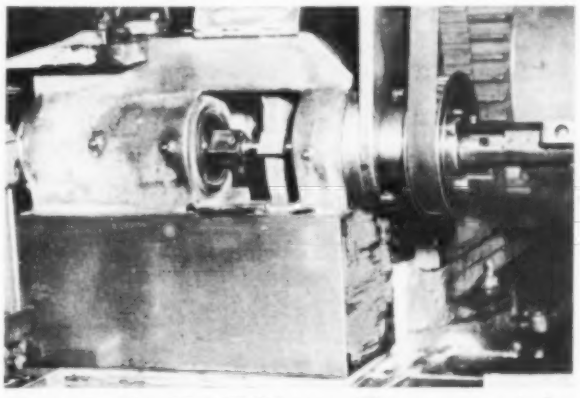
Cams are approximately two times the size of the insert. Of most importance is that the distance between the highs and lows of the insert be held on the highs and lows of the cam. One of the most important dimensions of inserts is between the inscribed circle of the insert and the apex of the radius of any corner.

Tolerances are held well within the code standards and the finish is held to 8 rms. Average stock removal is approximately .020". This depends upon size, type, etc. of insert. Diamond wheels, 220 grit 100 concentration are used with a water soluble oil as coolant. Note that a finer grit size is used when grinding on the periphery of the wheel. Speeds vary with the material and insert shape and the machine is equipped with an electronic feed control so that easy adjustment can be made for stock removal and spark-out for finish.

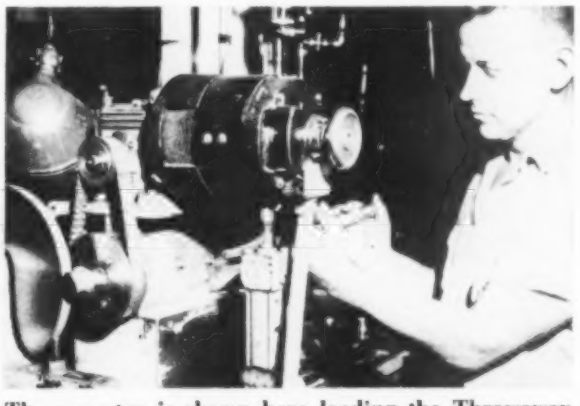
Triangular, square and diamond shaped inserts are ground on this machine. To improve control and increase production an air-hydraulic system was added for the table feed, cam pressure and wheel feed. (These were some of the first developed by Harvill-Johnson. Models now being sold are completely automatic.)

Negative and positive rake angles can be ground on these machines however, while negative angles can be obtained in the set-up described above, positive angles must be ground on one insert at a time.

It should be noted that V-R management commented that cam grinding is a positive method to obtain an insert with a perfect tangency between radii and sides. One other abrasive follows the two mentioned above when "pre-honed" inserts are required. V-R management has long recognized the importance of mechanically radiusing the edges of the inserts and have developed a means to provide this type of insert. Unfortunately this operation is too detailed for inclusion here. However, "pre-honing" is still another example of progressive thinking management. • • •



Above is the Harvill-Johnson Throwaway grinder which grinds the periphery of all shape inserts.



The operator is shown here loading the Throwaway grinder to grind the periphery. Note the cam and follower to the left.

Russian Research

Super Finishing Copper Cylinders

In a recent report from a leading Russian trade journal they have released information concerning super finishing of copper cylinders. While it indicates the depth and interest they take in abrasives, the article also points out their relative progress in this field.

By A. J. STEIGER

● A process for super finishing copper cylinders of 400 mm diameter and 1340 mm length (such as are used in deep printing rolls, textile printing machines, guide rolls on paper-making machines) that employs water-cooled silicon carbide abrasive instead of oiled slate has been developed in the USSR, according to a recent report in the *Vestnik Machinostroenie* (Machine-Building Herald), leading Moscow journal in the machine-tool industry.

The new process using water as the "cooling-lubricating fluid" is an improvement over slate super finishing, the Russian journal stated, because the latter is both time-and-slate consuming and "distorts the geometric form of the cylinders being finished, due to design features of the grinding machine used, which imitate in working principle the manual super finishing method formerly employed." Moreover, the report said, because of specific printing industry conditions, the use of oil or oil-kerosene mixture for cooling lubrication was ruled out in super finishing the copper cylinders.

Green silicon carbide stones were used after Russian research had established their capacity for superfinishing copper without "clogging pores with copper cuttings," a phenomenon observed when working with electrocorundum stones. The Russian research findings on the finishing properties of various grades of abrasives are shown in Fig. 1 which is stated to compare the performance of electrocorundum (6.9 and 6.3 microns for H_{max}) and silicon carbide of different kinds (3.5, 3.2, 1.6 and 1.3 microns respectively for microroughness height).

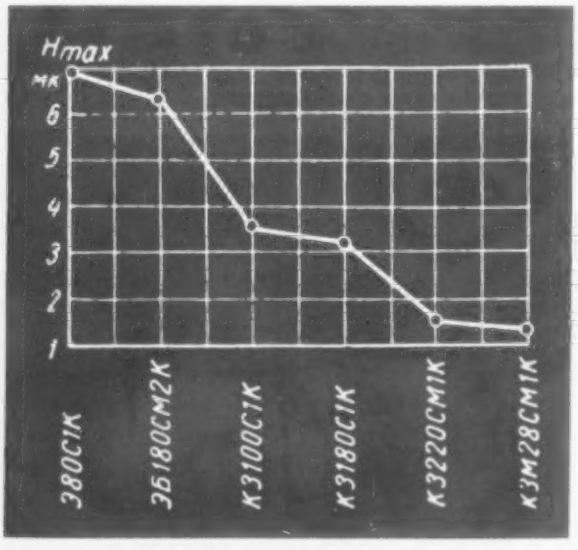


Figure 1. Surface finish results from the use of various types of abrasive stones.

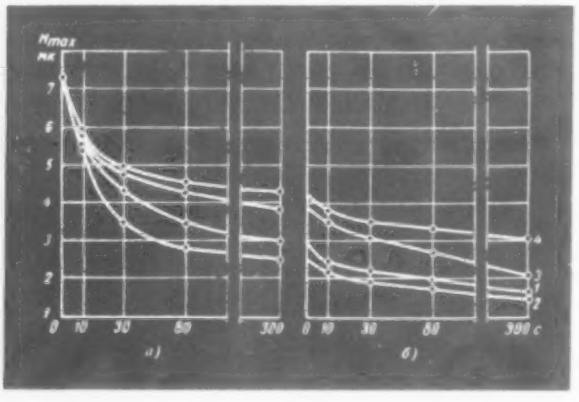


Figure 2. Dependence of H_{max} (Microroughness height) on the conditions and duration of super finishing copper specimens of 180 mm diameter and 300 mm length with initial H_{max} of 7.2 microns. Curves are described in text.

"The good performance of silicon carbide stones in finishing copper can be explained by the property of green silicon carbide grains to splinter and break off, which secures sharp cutting particles constantly present on the bar working surface," said the Russian journal. "The explanation of the absence of clogging in these bars is that the cuttings separate without fusing owing to the negligible cutting speed and the abundant supply of lubricating-cooling fluid (water), and the green silicon carbide granular surface has minimal roughness compared to other grade abrasive grains.

"The process of super finishing is also helped by the particles of split-off and crumbled abrasive grains which, owing to the shallow depth of finished graduation lines, cannot be washed out at once by water from the zone of contact between the bar and work-piece. In this contact zone a continuously renewed 'paste' is formed of water saturated with abrasive particles, products of binding depletion and finest cuttings. The cutting capacity of this paste is continuously maintained on account of the newly incoming splintered abrasive particles; besides the larger particles are rolled on the surface being finished, participating in the cutting process."

The Russian experiments with silicon carbide established that super finishing of copper cylinders was feasible "in two passes: roughing (see Fig. 2a) with stones of grade KZ100-180CMIK and finish (see Fig. 2b) with stones of grade KZ220-M28-CMIK," the Moscow journal went on, giving the following specifications on the grinding process employed:

"The super finishing was done under the following conditions:

(1) with number of dual stone runs z = 1000 per minute, length of stone run $l_1 = 5$ mm;
(2) with z = 550, $l_1 = 5$ mm; and
(3) with z = 1000, $l_1 = 1$ mm; and
(4) with z = 1000, $l_1 = 5$ mm.

"In all cases the work-piece circular velocity was equal to 5 meters per minute, the lateral tool rest feed was 0.8 stone length and the specific bar pressure was varied from 0.5 kg/cm^2 at the start of the roughing pass to 2.5 kg/cm^2 at the end of the finish pass.

"As evident from Fig. 2, the H_{max} reduction is most intensive at the initial stage of the process; for instance, H_{max} is reduced from 7.2 to 3.5 microns during the first 30 seconds of the roughing pass, while during this same time in the finish pass, H_{max} is lowered from 2.4 to 1.3 microns."

The Russian research in super finishing copper with silicon carbide stones was done on a special small-size heading attachment which "differed from known designs in that machine tool rest dismantling was not required," the report stated. The attachment was fixed to a turning lathe's tool holder rest, and was found to give the best results when the number of dual runs was 1000 a minute and the stone run length was 5 mm.

The research findings for super finishing of copper were found to be identical with those derived from analogous work with steel, bronze and copper, the report stated.

Shown in Fig. 3 is the design of the special head attachment* used in the Russian experiments. It works as follows. Motion is transmitted from the electro-bitstock to change gears 2 and 3, and also to interchangeable shaft 4, in which gear 3 is mounted. Changeable shafts 4 have journal 5 which is, with respect to the shaft axis, biased by the magnitude of the stone run. Mounted on journal 5 is ball bearing 6 which is placed in a groove of slide block 7. The slide block pins are placed in bronze bushings of gear box lugs 8. Fixed to slide block 7 is bearing plate 9 with bushings 10 for the guide columns 11 of stone holder 12. Attached to the bearing plate are two lamellar springs 13, through which pressure force is transmitted from the screw of the tool rest cross feed to stones 14 which are fixed by screws in holder 15. The guide columns secure primary tension of lamellar springs 13. The heading attachment has dynamometer 16 to determine the bar pressure on the work-piece and consequently, also specific stone pressure. Stones 14 are clamped into the holders. For more complete utilization, the stones can be glued with bakelite lac to metal plates that are clamped in the holders. • • •

*Two similar attachments are presently being manufactured in this country, Gisholt Machine Company, Madison, Wis. (Grinding and Finishing, March 1958) and Taft-Peirce Manufacturing Company, Woonsocket, R.I. (Grinding and Finishing, August 1959). In our opinion both of these attachments are superior to the Russian attachment.

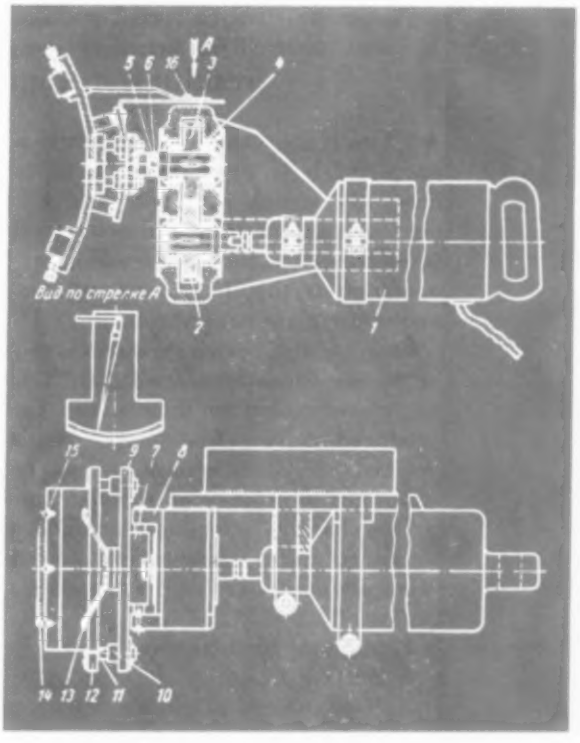
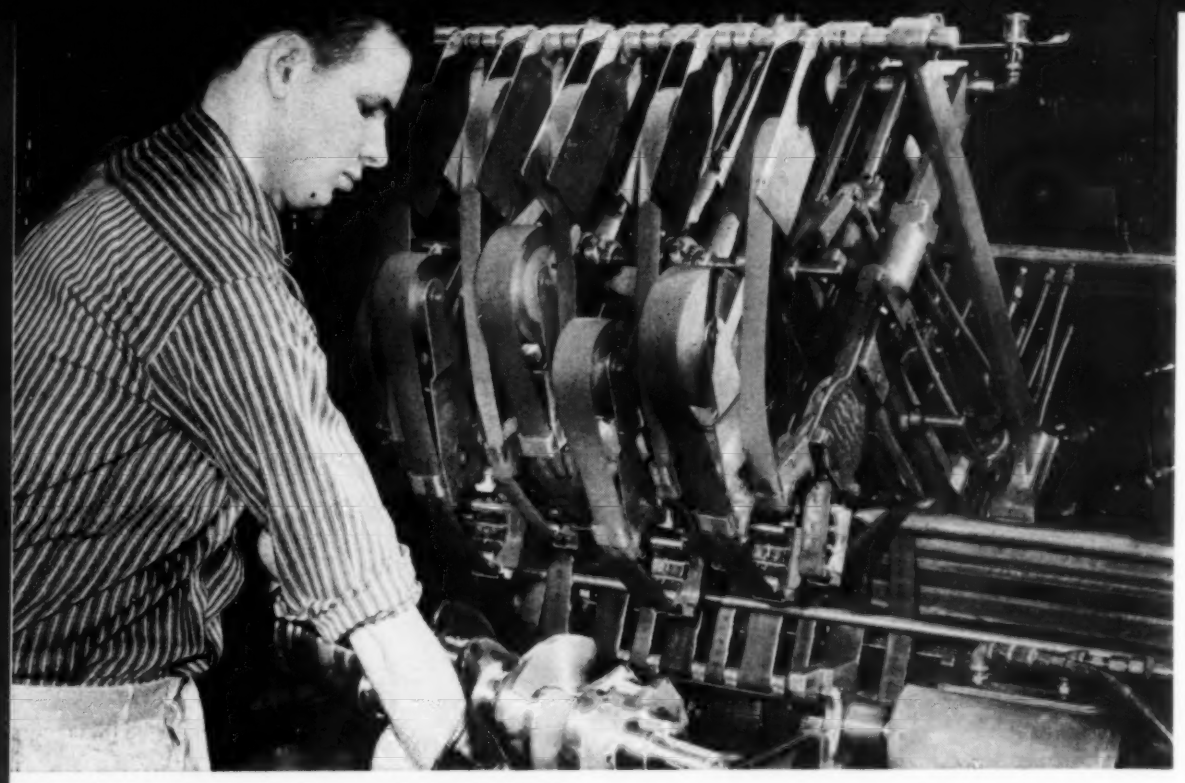


Figure 3. Drawings show the design of the super finishing attachment used by the Russians. The sentence in the drawing states that the view below is from arrow A. An explanation of the parts and their function is given in the text.



Shown here is an A. P. Schraner & Co. Lapper in operation at Buick Motor Co. Now using paper back coated abrasive rolls.

Quality by Coated Finishing Crankshafts

By A. JOHN KIRSCH, senior engineer
Coated Abrasive Div., The Carborundum Company

The design engineers require quality of the finishing of bearing surfaces on a crankshaft. This quality is obtained by coated abrasive lapping of these surfaces. The lapping operation is in turn carefully supervised resulting in continuous improvement.

● Finish polishing a crankshaft to an acceptable micro-finish is a sensitive operation. The car's heart, the engine, soon falters and expensive repercussions reverberate directly to the manufacturer when the finish is inadequate. The lapping operation is therefore constantly in sharp focus and under close supervision.

Lapping with coated abrasives is the usual means of surface finishing a crankshaft. Concentric surfaces conforming to their mates can be readily produced. A very fine surface finish can be developed and surface patterns can be sufficiently controlled to produce an excellent surface.

The elements affecting friction in bearing performance have already been considered in the crankshaft's design by the design engineer. They are briefly:

1. Material combinations
2. Surface finish
3. Surface defects and service contamination
4. Lubricants
5. Hardness of bearing materials.

Obviously these blend into a compromise of properties to produce an average end-objective of performance. Figure A offers a schematic comparison of a rough and a fine (low micro inch) finish, and illustrates the average relative peak-to-peak contacts prior to a load being placed on the bearing surfaces. As the load increases, the peaks crush down, plastically deforming until the area of contact is sufficiently increased to support the load.

According to one theory,* when two contacting metallic high spots deform together plastically, the abrupt movement causes roughening of the interface of contact. This occurs along crystallographic slip planes in the metal, and when multiplied by the many developing peak deformations, several slip systems occur. Roughening will take place in several directions. When a pair of firmly interlocked high spots is forced to move apart, failure will result.

The energy accompanying a high spot deformation process is transformed into heat which causes a sudden temperature increase along with mechanical distortion. When the heat is conducted through the interface, instant diffusion occurs. If this process is rapid enough, welding of the sheared peak to the opposite high spot can occur. A piece

of metal then is introduced into the system from this point of created bearing wear, and may cause damage before it is removed by the lubricant. If conditions are such that no appreciable diffusion heat is produced, adhesive force, if sufficiently strong, can keep the particle of metal adhered to the opposite peak. The small piece of metal sheared off the high spot leaves as a loose wear particle, in the pressure lubricating system, as soon as diffusion and adhesive forces are weakened.

As the oil film deposited on the bearing is so much thinner than the peaks of a commercially prepared surface, it cannot offset peak shearing, or welding, in even the best prepared surfaces: but it can reduce it considerably. On the crankshaft journal the load imposed by the connecting rod, assisted by the forces of gravity, tends to squeeze out the oil lubricant. With heat lowering the lubricant viscosity and resistance, the oil film thickness diminishes to the point where it is less than the height of the surface irregularities, and penetration occurs resulting in impending bearing failure.

It is obvious from this viewpoint why crankshaft journal surfaces on high performing engines require highly refined finishes.

The Lapping Operation

The lapping operation is almost the last function and is the operation having the greatest investment. The degree of precision in this operation determines acceptance or rejection of the entire foregoing sequence of crankshaft manufacturing operations.

Different machines are utilized throughout industry to lap crankshafts. However, the Schranner Lapper and the Impco Polisher are the most established and widely-used types of equipment employed. Such equipment uses coated abrasives, in 50 yd. rolls in widths ½" wide and wider, normally cloth backed for lubricated operations and, (occasionally), paper backed for the unlubricated dry lapping procedure. Lapping is now being done in many instances with Flexbac® Polishing Rolls. This newly developed product gives finer finishes with greater economy under lubricated or non-lubricated conditions.

The backing of this new economical coated abrasives item is a specially constructed paper. This product possesses high edge-tear resistance and extreme flexibility with a degree of conformability comparable to cloth. Because of the inherent controllable stretch characteristics and high tensile strength, in both length and cross directions, surprising resistance to impact is obtained. The innate resiliency gives a superior finish with a grit one grade coarser than the coated abrasives formerly used on crankshaft lapping operations. All types of cutting and lubricating oils, lard-oil mixtures, and mineral solvents, may be used with this type of coated abrasive.

Surfaces polished with it have very low variation in finish because of its built-in ability to conform to curving and spherical surfaces. The dynamic tensile resistance is likewise superior to much stronger paper products, enabling it to replace cloth in most instances. The fillets on crankshaft bearings do not cause kinking and tearing because the paper conforms to the curving surface and elongates to accommodate the stresses incurred during the lapping operation.

The lapped or polished surface obtained is critically dependent upon the finish imparted to the bearing surface by the preceding crankshaft finish grinding operation. The finish ground surface must be free of wheel marks in a micro-inch range of 15 to 50 rms. The resulting lapping operation will then yield a finish ranging from 5 to 20 rms. The lapping operation only improves the surface finish established by the finish grinding and should in no way be considered a grinding (stock removal) operation. Depending upon the grit size of the coated abrasive, machine head pressures, time of lapping cycle, and type of steel, the average amount of stock removed varies from .00005 to a maximum of .0003. While an unlubricated lapping operation can produce a 20-25 rms. finish, industry often requires finer finishes. Requirements in the range of 5 to 10 rms are demanded on many high production crankshaft lines. The best lapped finishes are produced on lubricated operations on definitely timed and adjusted-equipment, of the type previously mentioned. The resultant finishes range from 5-15 rms. This degree of finish is required for suitable performance and service on the present type of steel crankshaft used in high-compression engines powering present day passenger cars.

The most important variables affecting the lapped finishes obtained, (assuming proper machine conditions and adjustments)are:

(Continued on page 34)

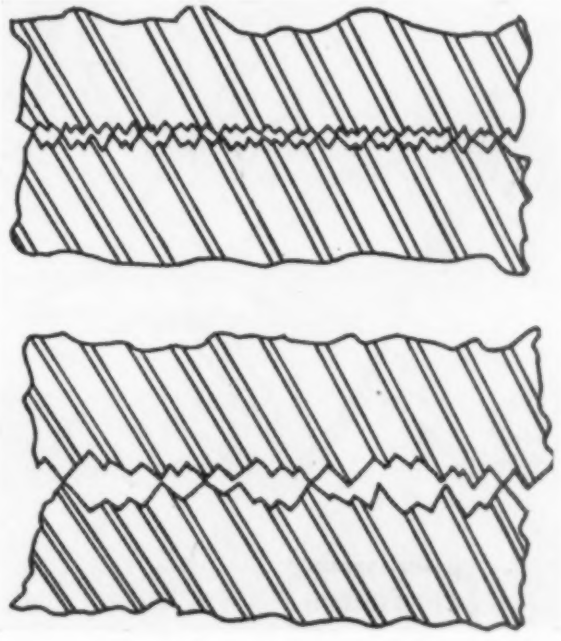
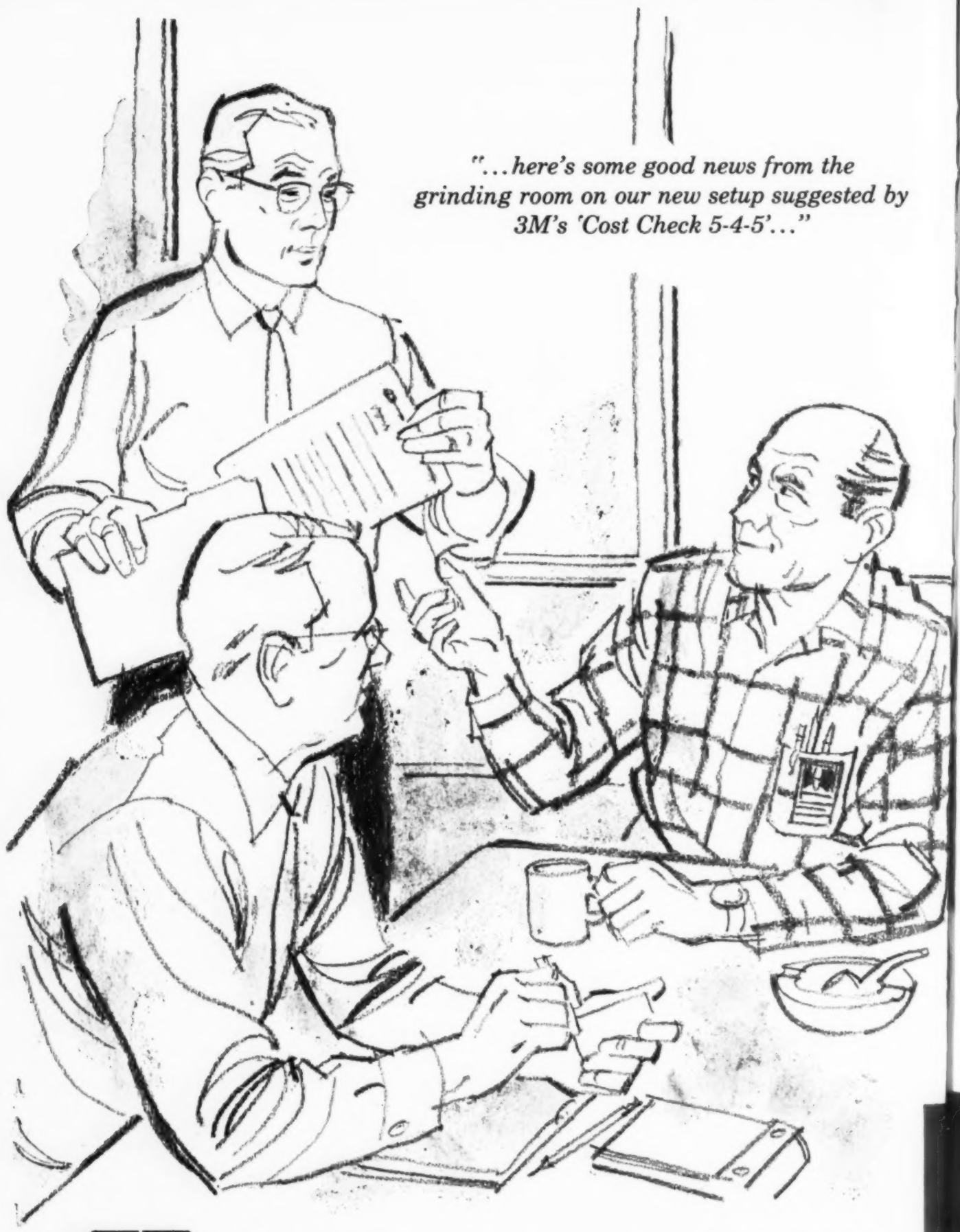


Figure A. Shown above are two schematic drawings of the comparison of a rough finish and a fine finish which illustrate the relative number of peak-to-peak contacts before a load is placed on the bearing surfaces.



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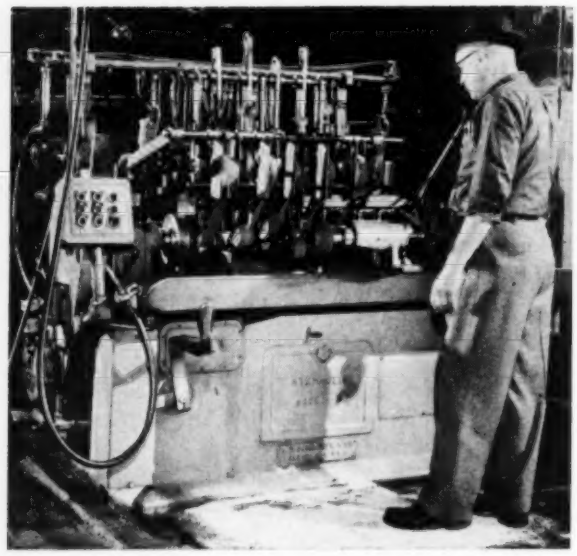

Crankshaft lapping is being performed as shown here at Studebaker. Fine finishes with small stock removal improves quality of bearing surfaces.

1. The crankshaft final finish grind
2. The type of lubricant used and whether or not the lapper coolant is filter cleaned.
3. Length of time allowed for lapping and the shaft R.P.M. during polishing cycle
4. Amount of feed and grit size of the coated abrasive material used
5. Machine adjustment and head pressures.

Comparison of surface finish by profilometer values has done much to provide a widespread standard specification as to finish desired; finish obtainable under a given set of conditions; process inspection standards; and machine, and engine, design. However well established, evaluated, and accepted as a criterion of surface finish, micro finish (rms) as graded by the profilometer, appears to be only a part of finish acceptance. The shop may use terms as reflective, mirror, and ultra, connecting them with a certain finish appearance.

This traditional influence can be deceiving, for a high luster finish may disguise a very imperfect surface, while an almost perfect surface may present a dull, velvet or matte appearance. Within limits nearly any class of finish can be erroneously described, unless it is meticulously tested and measured. Deviations from acceptable finish consist chiefly of visual flaws, checks, scratches, pinholes, grinding marks and the like. Roughness—the defect usually meant by shopmen when they discuss surface quality—is best evaluated by an instrument such as a profilometer in company with a check list of points to observe for a trouble free crankshaft lapping procedure. Acceptable finish using Flexbac® Polishing Rolls or other coated abrasives will then follow.

Profilometer inspection of finish is shown being performed at Studebaker. Lapping by coated abrasives holds very low finishes.

Check List:

1. Spindle clearance sufficient to take a roll of coated abrasive without jamming. This is more likely to occur in the coarser grit sizes.
2. Spindles should be free turning.
3. Suitable machine maintenance to replace worn roll guides is important and should be standard procedure. They become worn to razor edge sharpness by the constant rubbing of the unwinding rolls of coated abrasives, and can then catch, snag, and cut the abrasive strip material.
4. Grinding pads, liners or inserts are usually expendable and should be replaced by the machine set-up man regularly. They become chip loaded, grooved and worn. This affects both the finish obtained and causes localized excessive wear on the coated abrasive.
5. Some polishing heads have rollers over which the coated abrasive is drawn. These should be checked to assure that they turn freely.
6. Polishing heads that incorporate individual, mechanical polishing pressure adjustment can be somewhat troublesome. Hydraulically-operated heads function more smoothly and with greater precision.
7. The tension device between the feeder rolls and the polishing heads on most machines is adjustable. High tension setting can cause breakage during a polishing cycle when there is insufficient slack between the revolving crankshaft and the feeder rolls.
8. The amount of abrasive used for each cycle during the lapping of the journals of a crankshaft has a definite influence on the finish obtained. The most economical is the smallest amount of abrasive advance possible to obtain the finish desired. However, too small a feed of cloth or paper products can create wear-through and breakage. The average feed is ¾" to 1½" dependent on the type of equipment and the method of operation. It is recommended never to use less than ½" per cycle to obtain adequate lapping results.

The economics of any grinding operation is important, especially when the finish is being improved in the low (5-15 rms) micro finish range.

• • •

*"Metal Transfer and Wear"—I. Ming Feng Journal of Applied Physics, Vol. 23, Sept. 1952, pp. 1011-1019.

Grinding and Finishing

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281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EDITORIAL

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
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71	72	73	74	75	76	77	78	79	80
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EDITORIAL

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
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What article in this issue interested you most?_____

_____

What subjects would you like to see published in future issues? _____

_____

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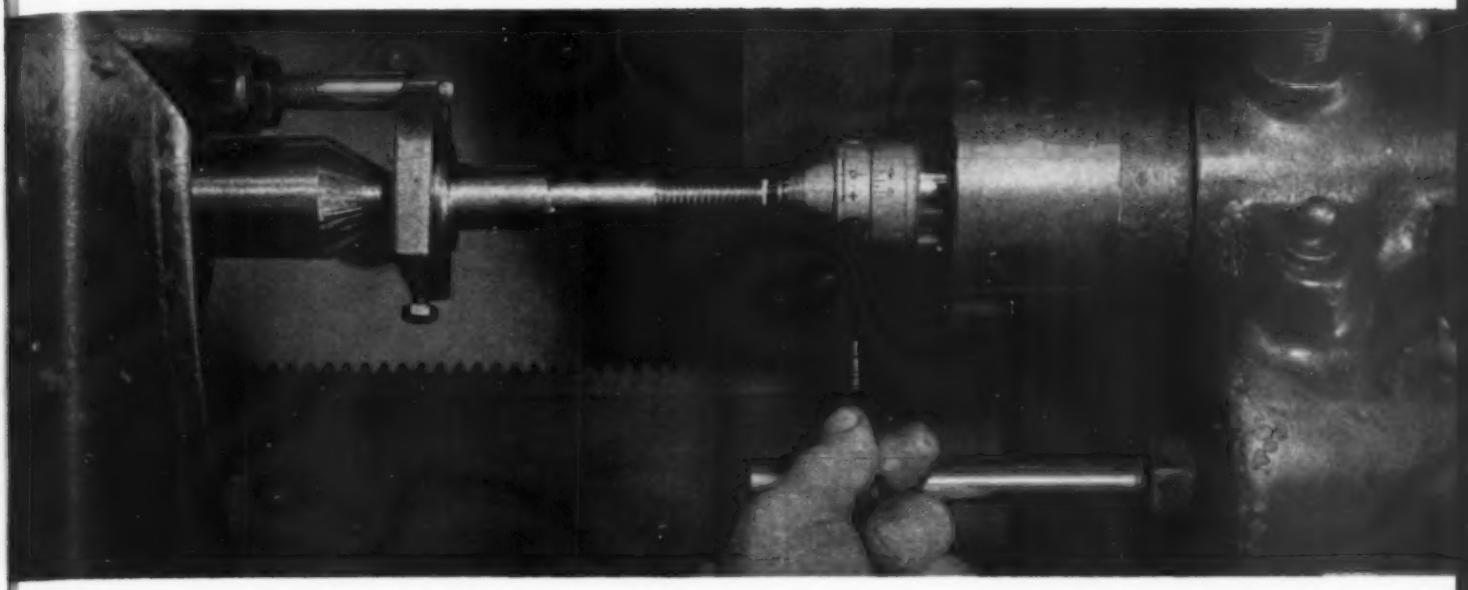

Adjustable Center Reduces Setup Time

Simple, quick setup and adjustments can be obtained by use of a new adjustable center. Tapers or correction can be ground up to .012″ on the diameter to tenths with almost no setup time.

Special to **GRINDING** and **FINISHING**

● Trueing the work between centers of cylindrical grinders is the first step to precision grinding. The time required to align a workpiece depends on the age and condition of the machine, and the skill of the operator. In many cases, too much valuable production time is lost by time-consuming, hit-or-miss tailstock adjustments to obtain correct alignment.

The recent introduction of the "Micro-Set" Adjustable Center (developed by Enco Manufacturing Co.) which permits quick, easy work alignment from the grinder tailstock or headstock, answers problems of aligning work on cylindrical grinders, cutter grinders, and other center alignment applications.

On dead spindle machines, the center can be used in the headstock along with a half center in the tailstock for small work requiring wheel clearance. The new center permits the operator or set-up man to make precise headstock-tailstock alignment in approximately half the time required by the old method.

An example of the usefulness of this center is cited by a large electric company where the Micro-Set Center is used both on live and dead spindle machines. They have saved from 40% to 50% in setup and greatly reduced scrap loss by using the center for alignment and are especially useful for grinding and maintaining a slight degree of taper on such items as arbor shafts and drive pins. Another example of its usefulness is on older machines which have no micrometer or electronic adjustment. Saving in time depends upon the previous setup times.

Used on cutter grinders the adjustable center permits precise taper on straight grinding of cutting tools.

A midwest manufacturing company reports the Micro-Set ideally suited for grinding ganged staggered tooth milling cutters to identical diameters on arbor. They also report its use in grinding reamers since a slight back taper is often required to prevent bell mouthed reaming. This

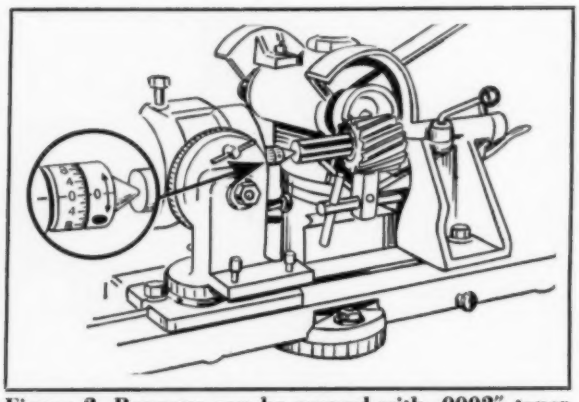

Figure 2. Reamers can be ground with .0002″ taper through the use of the new adjustable center.

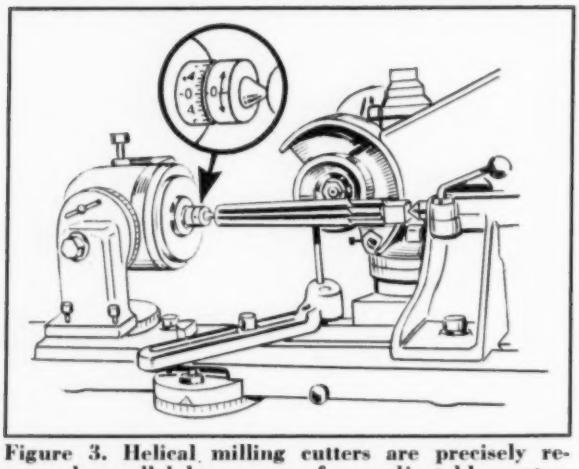

Figure 3. Helical milling cutters are precisely reground parallel by means of an adjustable center.

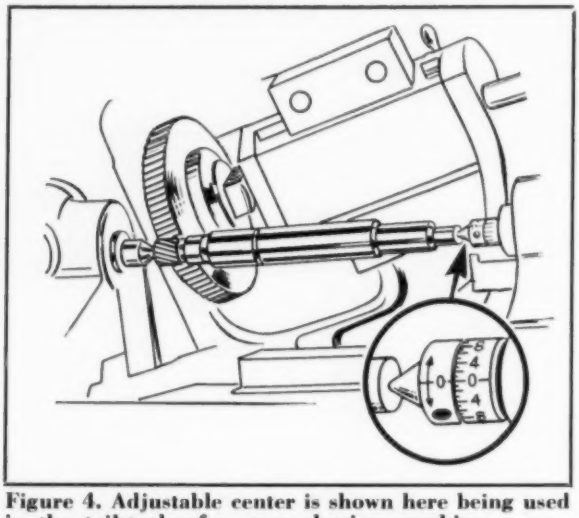

Figure 4. Adjustable center is shown here being used in the tailstock of a gear shaving machine.

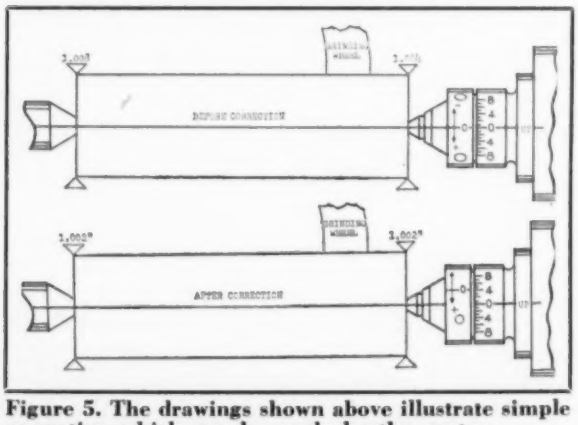

Figure 5. The drawings shown above illustrate simple correction which can be made by the center.

taper is approximately .0002″ per inch depending on material, size and application of the reamer.

Figure 2 shows taper reamer being ground between tailstock center and adjustable center in the headstock. Since the tip movement is calibrated in .0005″, movement between graduations allows the operator to work to .0001″ or .0002″ after getting the feel of the center.

Figure 3 shows a helical milling cutter being reground on an arbor with the adjustable center mounted in the headstock to precisely parallel grind the cutter. Corrective movement can be accurately made regardless of center positioning with respect to table fulcrum.

Figure 4 shows the use of the adjustable center in the tailstock of a gear shaving machine. The pinion length with respect to the distance between center gives additional numerical division of calibrations. For example, if the pinion length was 1/10 the distance between centers and the adjustable center was moved 1 calibration or .0005″, this would result in a correction of .00005″ across the face of the pinion. This same advantage is naturally gained when grinding proportionate amounts of step shafts or like workpieces.

Corrective movement of the work held between the grinder headstock center and the center in the tailstock is accomplished in seconds. The adjustable center is comprised of an eccentrically ground sleeve and arbor, which, when assembled, compliment each other at "O" and embody a true center. Hence, when the "O" on the arbor is moved either side of "O" on the sleeve, the center point in a .006″ radial arc which provides this micro adjustment. Each calibration moves the tip .0005″ or .001″ on diameter which is read directly on the sleeve by the operator. Total tip movement in either direction is .006″.

Figure 5 illustrates the method of correction on a 12″ workpiece. (Driver dog is not shown for ease of illustration.) The upper drawing shows the diameter measured at each end after cleanup cut is taken with the table and the center set at "O". This measurement shows a .002″ misalignment with respect to table travel or .004″ on diameter. The lower drawing shows the correction made by moving the "O" on the center arbor to rear (away from the operator) or toward the minus side, which moves the tip toward the operator or away from the wheel, resulting in less stock removal at the tailstock end of the work piece on the next cut as shown by the measurements in the drawing. Should the center be used in the headstock of a dead spindle machine to make the same correction the "O" on the arbor would be moved forward (toward the operator) or to the minus side, which moves the tip away from the operator or toward the wheel, resulting in more stock removal at the headstock end, thereby making the same correction. A full range of popular straight and taper sizes is available. • • •

American Society for Abrasives

Saginaw Valley Chapter

Only the name has been changed. The membership, number, and all other components of the chapter remain the same. The change of name from Flint to Saginaw Valley was approved earlier this year, to reflect more accurately the area served by the chapter.

Implementing a report of the Student Aid Committee consisting of William Bendle, Thomas Hancock, and Ross Boergert, an award of $200 was made to Catherine Ann Burdis, a junior from St. James High School of Bay City, Mich., as the contestant scoring the highest number of points in the Saginaw, Flint, and Bay City-Midland Science Fairs.

Her winning entry was, "Chlorella—Food of the Future." While it was recognized that awards to exceptional entries at these National Science Fairs may not directly promote abrasives, it was considered that such an interest in science may well be turned to abrasive engineering.

The objective of the Fund is stated as follows: "To present to the youth of our high schools the advantages of abrasive engineering."

Presenting the Student Aid check for $200 to Catherine Ann Burdis, a 17-year old junior from St. James High School, Bay City, Michigan, is Thomas Hancock of Flint. In the photo, left to right, are Mr. Hancock; Miss Burdis; Ross Boergert of Saginaw, another member of the committee; and the Very Reverend Monsignor Wynn, pastor of St. James Parish, Bay City.

Pittsburgh Chapter

Pittsburgh's Golf Day, their second, brought out eighty members and guests for golf—a few, according to the report, even played—and 127 for dinner. The affair was held at the Mt. Lebanon Country Club on Thursday, June 23.

Frank DeVilling was chairman of the day, and **Jim Daniels,** the new president, conducted the business meeting. Golf shirts and golf balls were awarded to winners as prizes.

During the business meeting Daniels announced the following committees: Membership—**Don Jones,** chairman; Bun Walker, Frank DeVilling, George Lawlor, Jack Parsons, Bob Joyce, Walter Hugo, and Len Mackel, members. Program—**Cliff Beattie, Sr.,** chairman; Keith Bishop, Frank Cramer, Al Villing, members.

The goal for new members is sixty. Membership meetings will be resumed in September.

Cleveland Chapter

The first annual golf party for the chapter saw 53 members and guests turn out at the Lakewood Country Club. **Dick Parker** of Abrasive Tool and Supply was the chairman.

At the meeting held May 16 at the Cleveland Engineering and Scientific Center, 3100 Chester Avenue, Cleveland 14, the speaker was **Erwin C. Winkleman** of the Industrial Diamond Division, Engelhard Hanovia, Inc. The topic was Natural Diamonds.

No meetings are scheduled for the summer, but will be resumed in the fall. All meetings are held at the Engineering and Scientific Center.

Chicago Chapter

Forty-eight golfers teed off at the Cog Hill Country Club, Lemont, Ill., in the second annual Golf Day of the Chicago Chapter. After assorted drives, chips and putts, **Tony Dudek,** shop superintendent of Ace Grinding and Manufacturing Co., came in with the low gross score, and John Davis of Cortland Grinding Wheels Corporation, with low net.

Both received trophies donated by Waltham Grinding Wheel Company and presented by **E. S. Avery,** vice president of the company. Numerous other prizes were awarded.

Henry Hoppe, chapter secretary, was chairman of the affair. **Bob Hanke,** the new president, in his opening remarks, pointed out the membership potential of the Chicago area, and called for a 200-member chapter by next June.

Over fifty members and guests attended the dinner. • • •

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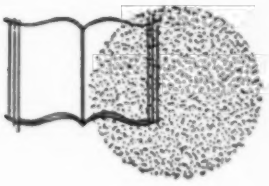

Literature

1. Vibratory Finishing. An informative 12-page bulletin on vibratory finishing has been released by Lord Chemical Corporation. Profusely illustrated, the booklet uses photos and drawings to show equipment features and operating principles as well as showing applications. Specifications are listed for five models in the Lorco line of vibratory finishing equipment. Bulletin No. 600. Lord Chemical Corporation, 2068 South Queen Street, York, Pennsylvania.

2. Disc Grinding Wheels. A new four-page color brochure just off the press illustrates the many types of disc grinding wheels manufactured by the Macklin Company. Desired wheel characteristics for efficient disc grinding operations are listed and documented by case histories. Photos of various kinds of disc wheels for the disc grinding of various products and materials. The Macklin Company, Jackson, Mich.

(See Number 2)

3. Diamond Wheel List Price Catalog. Diamond Tool Research Co., Inc., has just published a larger and more extensive catalog covering diamond wheels, hones, and mandrels. For all wheels with natural diamonds, DTR will supply their Pressure-Tested diamond grit at no extra cost. For man-made diamonds, newly-developed bonds are featured. A unique pricing system to make possible savings for the user has been inaugurated. Diamond Tool Research Co., Inc., 380 Second Avenue, New York 10, New York.

4. Power Tools. A new full line two-fold mailer-catalog with photos and condensed specifications of power tools has been brought out by Skil Corporation. This two-color, eight-page mailer covers portable and bench grinders, belt and disc sanders, polishers, abrasive products, and related tools. 81 tools in all are listed. Skil Corporation, 5033 Elston Avenue, Chicago 30, Illinois.

5. Standard Diamond Tools. In a comprehensive 36-page catalog, The Staset Company, Inc., has now made available diagrams, specifications and pricing information on 232 standard diamond tools. In addition, this handy source provides fully illustrated sections covering cluster and impregnated tools, radius dressing tools, Staset "rib-nib" mounting, wheel type tools, grit and tandem tools, and blade type tools, as well as complete information on Turn-A-Tool, the new design which provides a quick and easy identified by both old and new shape way to keep the diamond sharp. Catalog No. 460. The Staset Company, Inc., 70 Franklin Avenue, West Orange, New Jersey.

(See Number 5)

6. Automatic Cutter Grinder. Twenty-page loose-leaf brochure describes the operation and the specifications of the new Ingersoll automatic cutter grinder. Profusely illustrated, the piece lists the advantages of the machine for shops where maintaining inserted-blade milling cutters is an around-the-clock job, and where the number of cutters ground per week warrants investing in time- and labor-saving equipment. The machine is said to be suited to a wide range of inserted blade face milling cutters, to duplicate accurately cutter after cutter, to do all grinding operations on cutters, and to generate its own control cams from cutter blade contours or from any master cam. The Ingersoll Milling Machine Company, 505 Fulton Ave., Rockford, Ill.

7. Surface Grinder. High production rigidity and versatility are stressed in Norton Company's 16-page, two-color brochure on the 6" x 18" Type S-3 surface grinder. A maximum of 15" from the top of the machine table to the bottom of a standard 8" diameter wheel permits the grinding of tall pieces. Table speed is 125 fpm. The brochure is illustrated with full-view and closeup photos, and standard and auxiliary equipment is listed. Norton Company, Worcester 6, Massachusetts.

8. Diamond Wheels and Tools. Catalog No. 720, just released, is a complete listing of all diamond wheels and tools, from Delta Diamond Wheel Corp. Wheels, identified by both old and new shape designations, are available in both natural and man-made diamonds. Special types or shapes to customer specifications are also available. Catalog No. 720. Delta Diamond Wheel Corp., 1403 Utica Avenue, Brooklyn 3, New York.

(See Number 8)

(See Number 7)

9. Molten Metal Pumps. Four-page folder punched for plastic binder covers the Ruthman Gusher line of molten metal pumps. Pictures, descriptions, and capacities of the various units indicate their

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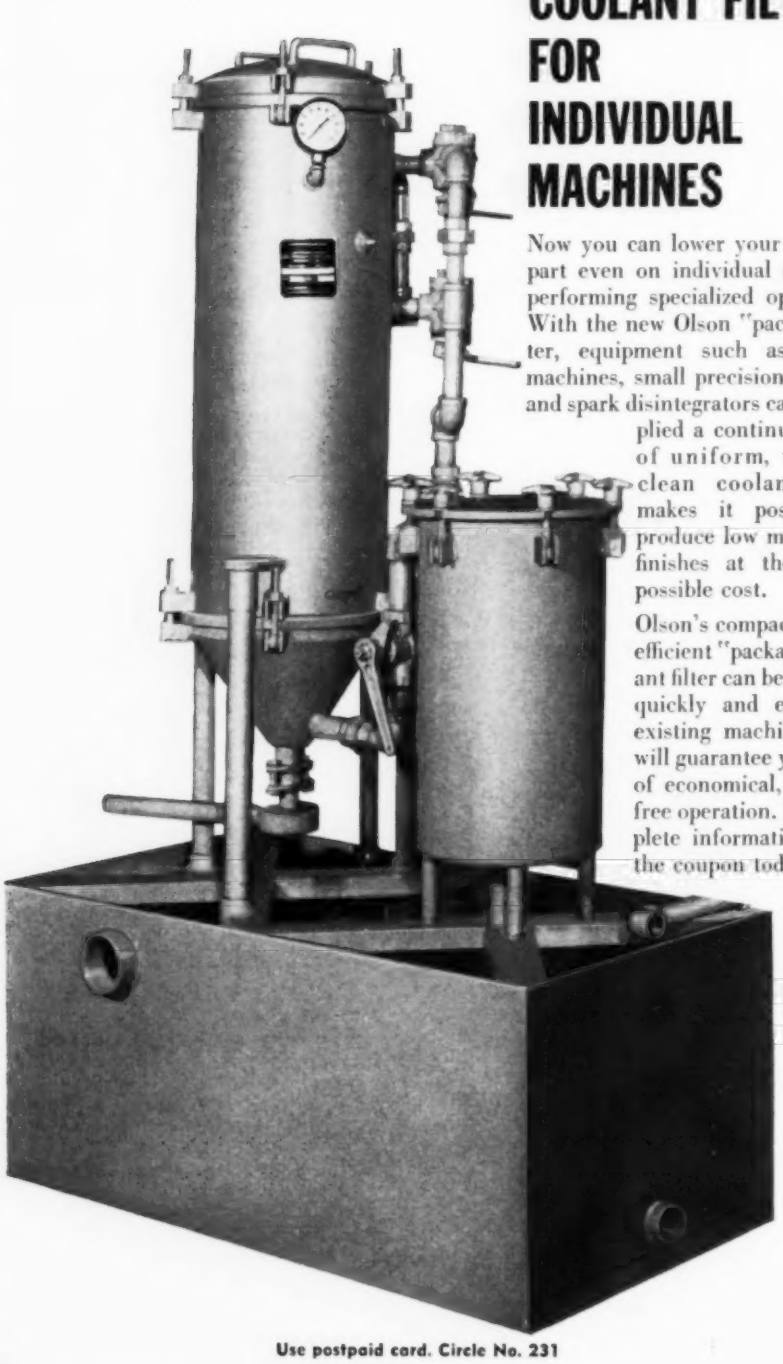

Now you can lower your cost-per-part even on individual machines performing specialized operations. With the new Olson "package" filter, equipment such as honing machines, small precision grinders and spark disintegrators can be supplied a continuous flow of uniform, visually clean coolant. This makes it possible to produce low micro-inch finishes at the lowest possible cost.

Olson's compact, highly efficient "package" coolant filter can be installed quickly and easily on existing machines, and will guarantee you years of economical, trouble-free operation. For complete information, mail the coupon today.

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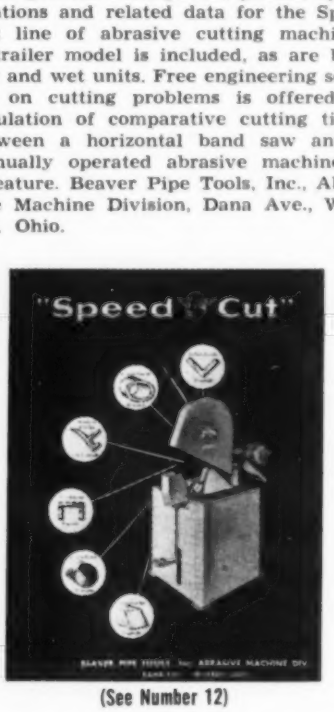
FREE LITERATURE *continued*

general area of application. Bulletin 58-F. The Ruthman Machinery Co., 1809 Reading Road, Cincinnati 2, Ohio.

10. Numerically Controlled Equipment. The case for Pratt & Whitney's numerically controlled positioning equipment is graphically and concisely presented in this 12-page two color circular entitled "Show Case of Numerical Control." Circular No. 639. Pratt & Whitney Company, Inc., Charter Oak Boulevard, West Hartford 1, Conn.

11. Miniature Internal Grinder. A recent six-page gatefold catalog, well-illustrated, describes Bryant's Model B miniature Centalign® internal grinder. The machine is designed specifically for the grinding of miniature and instrument bearing races, requires only 8¼ square feet of floor space. Bryant Chucking Grinder Company, Springfield, Vermont.

12. Abrasive Cutting Machines. Flier provides general descriptions, photos, specifications and related data for the Speed Cut line of abrasive cutting machines. A trailer model is included, as are both dry and wet units. Free engineering service on cutting problems is offered. A tabulation of comparative cutting times between a horizontal band saw and a manually operated abrasive machine is a feature. Beaver Pipe Tools, Inc., Abrasive Machine Division, Dana Ave., Warren, Ohio.



(See Number 12)

13. Vibratory and Barrel Finishing Equipment. Coverage of Lorco and Techline precision finishing equipment is provided in Bulletin No. 1002, six pages, Lord Chemical Corp. Photos and text include Lorco vibratory equipment, Techline wet blast and barrel finishing equipment, media, compounds, abrasives, and auxiliary units such as degreasers, media pans, separators and storage bins. Directions are included for obtaining a free finishing analysis on specific parts. Bulletin No. 1002. Lord Chemical Corp., 2068 South Queen Street, York, Pennsylvania.

14. Tap Grinding. Four-page folder on card stock, punched for standard binder, contains a list of tapping troubles with

suggested solutions. Also included is a short explanation of tapping terms, tap sharpening procedure, and a check list of points for inspection before sharpening. Also available is a flier on a new Hybco universal two-way relieving fixture. Henry P. Boggis Company, 706 East 163rd Street, Cleveland 10, Ohio.

15. **Fabric Dust Collector.** Bulletin 279C describes the operation and design characteristics of the new Model B AMER-jet fabric dust collector, which is said to be applicable to any situation requiring the reclaiming of dry materials, as foundries, cement plants, and similar operations. Bulletin 279C, Dept. PD, American Air Filter Company, Inc., 215 Central Avenue, Louisville 8, Ky.

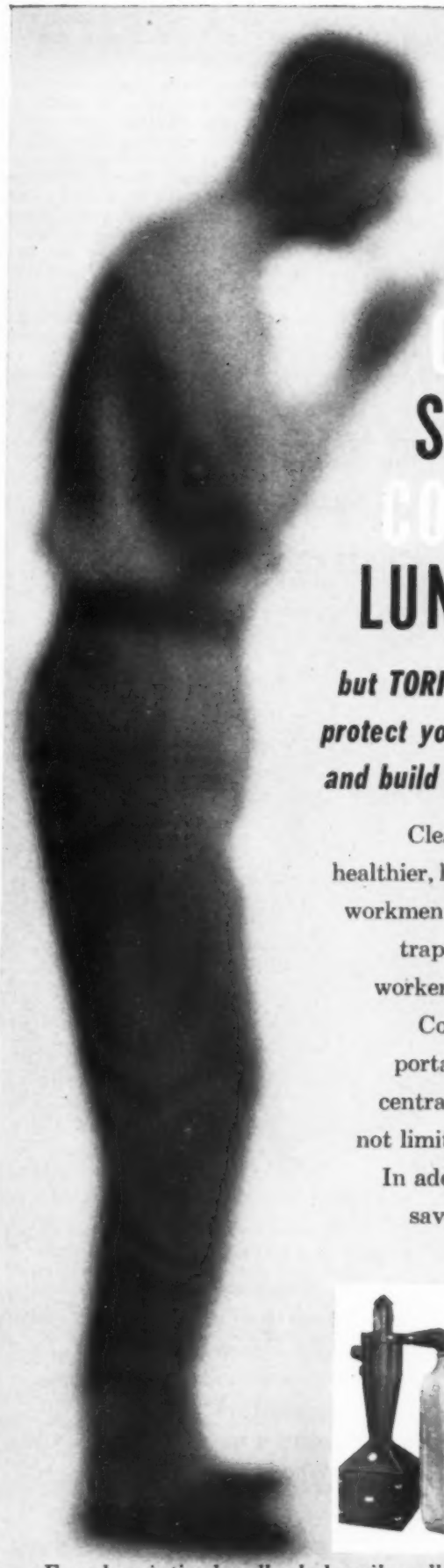
16. **Brush-backed Polishing Heads.** The full line of Vonnegut brush-backed polishing heads is featured in a new product bulletin from Grinding & Polishing Machinery Corp. The publication outlines some of the applications of 12, 16, and 32 brush heads available in a total of 9 models from 3 diameters. Also shown are standard and special machines for mounting the heads. Specs are given for heads and machines. Bulletin No. 114. Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Indiana.

17. **The Abrasives' Workshop.** The May issue of this Carborundum external publication features an article on the causes and correction of glazing, stripping, and loading of abrasive belts. Photos and special tabulations illustrate the problems. The solutions, it is stated, may involve the belt itself, the selection of lubricants, the contact wheel, as well as speeds, feeds, and pressures. The Carborundum Company, Advertising Distribution Section, Niagara Falls, New York.

18. **Maintenance of Swing Frame and Floor Stand Grinding Machines.** Another of the Grinding Wheel Institute safety publications is concerned with the maintenance of high-speed, heavy-duty grinding machines using large hole organic wheels, such as swing frame and floor stand grinders. Suggestions for proper mounting are given, and common faults, with their remedies, are discussed. A suggested method for inspecting flanges is explained. Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

19. **Dust Collector.** A low-cost portable dust collecting system, the Cincinnati Dust-Master, designed to fit on any 20 or 24 gallon waste can, is described and illustrated in a two-page notebook insert

"Look! I've been grinding out those crummy parts on that broken-down machine for this lousy company for over five years—And I can't understand why I don't get a raise."



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FREE LITERATURE *continued*

punched for standard binder. Bulletin DM50-60. Cincinnati Fan & Ventilator Co., 3548 Montgomery Road, Cincinnati 7, Ohio.

20. Tool Grinder. The Multi-Spiral universal grinder, designed for quick grinding and sharpening of a wide variety of cutting tools, is the subject of a two-page flier. Four illustrations of typical uses are shown, and lists of specifications and standard equipment are included. A list of optional accessories, with their prices, is also given. Spiral Step Tool Company, 5400 North Damen Avenue, Chicago 25, Illinois.

21. Mist Cooling Unit. The new Magnatrac adjustable air valve, M 20-C, for mist cooling on grinding and similar operations develops approximately 14 pounds vacuum at 10 pounds air pressure. According to a recent flier from Future Products, Inc., it reduces grinding time by as much as 90% and increases grinding wheel life by as much as 300%. Similar equipment is also described in two two-page catalog sheets. Future Products, Inc., Indianapolis, Indiana.

Standard Machine Tapers. A new revision of American Standards Machine Tapers, B5.10-1960, has been approved by the American Standards Association and published by The American Society of Mechanical Engineers. The standard now includes tolerances on the rate of taper and more complete data for plug and ring gages used for self-holding tapers and steep machine parts. In addition, the new edition is planned to help clarify the use and application of machine tapers. ASA B510-1960. $2.50 per copy. American Standards Association, 10 East 40th Street, New York 16, New York.

Head, Eye, and Respiratory Protection. A new revision of the American Standard Safety Code for Head, Eye, and Respiratory Protection, Z2.1-1959, has been published by the American Standards Association. Changes made since the previous (1938) edition include the addition of plastic eye protectors and an increase in the strength requirements for eye protection. One section contains 86 definitions of words common in the field. In general, the code has been brought up to date with modern production methods, working environments, and available safety equipment. ASA Z2.1-1959, 48 pp. $3.00 per copy. American Standards Association, Dept. PR121, 70 East 45th Street, New York 17, New York.

100. Sam Safety Posters. A single copy of the current Sam Safety poster, or of any one of the eleven which have preceded it, 8½" x 11", on 100# enamel, is available on request. Circle No. 100 on the Reader's Service Card. Nos. 1-9 (September, 1959-May, 1960) are available immediately; Nos. 10-11 (July-August, 1960) should be available about August 15.

For larger quantities, circle No. 100 on the Reader's Service Card, note on the bottom of the card the numbers and the months of publication of the posters you want, and enclose the card with a remittance according to the following schedule:

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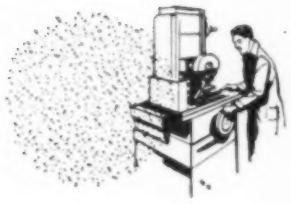


Equipment and Materials

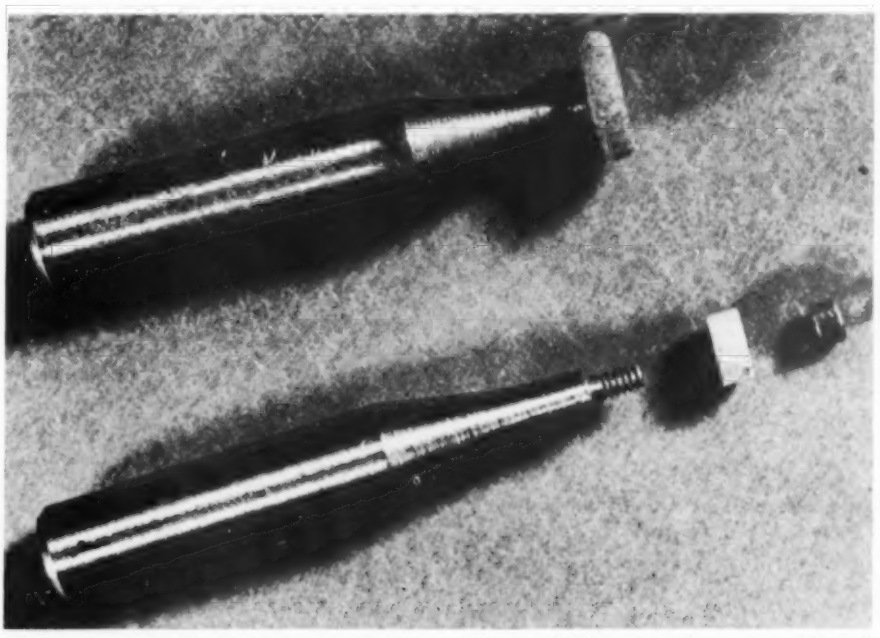
Tiny Grinding Wheels Claimed to Save Thousands Annually for Makers of Miniatures

The world's smallest grinding wheels, just developed by Bay State Abrasive Products Company, are claimed to save producers of miniature devices many thousands of dollars annually. The new wheels are nearly as small as the eye of a fly and are used in the production of miniature ball bearings for high-speed cameras, tape recorders, missile guidance systems and many other micro-miniature instruments.

According to Elden L. Auker, Bay State vice president, "Our new wheels are the tiniest ever made commercially, as far as we know. They will replace many applications for mounted wheels, in which the abrasive was permanently bonded to a tool shaft.

"Though the tiny new wheels themselves are 75 per cent less expensive than the points they replace," Mr. Auker continued, "the major saving is in productive costs, since now only the wheel need be replaced. With the older method it was necessary to retool the job, a time-consuming, delicate operation. We expect the new system to cut grinding costs sharply in micro-miniature production operations."

The Bay State development breaks one of the serious cost bottlenecks in the nation's miniaturization trend. Mr. Auker added, "In order to produce true wheels of such small size to operate at speeds up to 40,000 revolutions per minute and maintain size while removing sufficient stock, it was necessary to develop entirely new manufacturing techniques. Special abrasive grit combinations were also developed to give superior finishes."



The new small wheel, below, replaces the older mounted point above. Cost reduction in wheel is estimated at 75%; additional savings are effected in production since wheel replacement does not affect tool alignment.

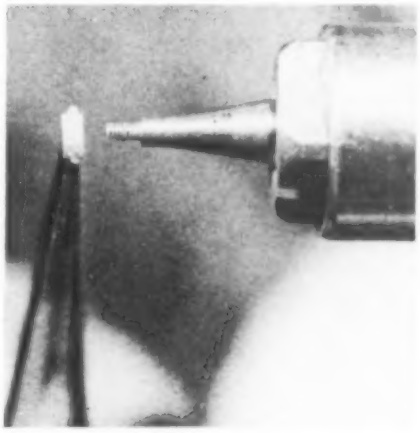
New Lilliputian grinding wheels break cost bottleneck in the nation's miniaturization trend. Size of wheel is suggested by relationship to fingers holding small wrench.

One of the fastest growing leading firms in the 170 million dollar abrasives industry, the Westboro, Massachusetts, firm has grown 425 per cent during a recent 10-year period, while the industry as a whole has grown 120 per cent.

Development of the new micro-miniature wheels is a result of a long-range testing program recently installed at Bay State. The program is designed to find new grinding methods, materials, speeds and coolants to cut production costs.

Bay State Abrasive Products Company, Westboro, Massachusetts.

Use postpaid card. Circle No. 41



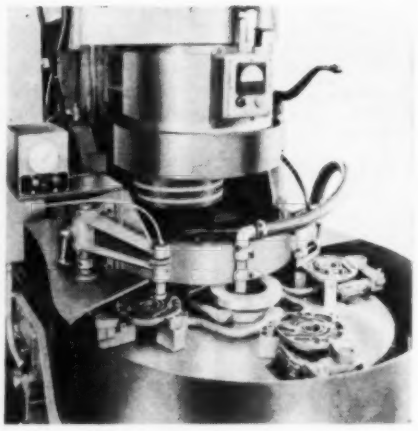
Tiny grinding wheel is slipped on spindle with tweezers in new approach to micro-miniature grinding operations.

Rotary Indexing Surface Grinder Has Orbiting Rotating Spindle

A new type of rotary indexing surface grinder on which the work is held in a stationary fixture under a wheel spindle that orbits as it rotates, reduces the cost of grinding pieceparts to close flatness tolerances. The grinder, manufactured by Mattison Machine Works, is being used in its first commercial application to grind pump piston cover assemblies to a flatness tolerance of .005" at a production rate of 140 per hour. Stock removal is .004".

The principle of generating a flat surface on a planetary head machine is similar in end result to what takes place on a conventional vertical-spindle rotary surface grinder. Instead of the piecepart spinning under a stationary spindle, however, it remains fixed and lets the wheel axis revolve around its center point.

This new method of generating flat surfaces has three economic advantages: (1) Holding the piecepart stationary in its fixture keeps it accurately oriented. Thus, it is easy to load, transfer, and unload the part without danger of mislocation. This makes the process ideally suited for grinding from the rough on transfer-type machines. (2) Equipment costs are reduced because fewer mechanical parts are needed to revolve the spindle than to provide separate drives for spinning the work. Also, fixtures can be simplified. (3) Continuous cutting, with index-type work table, increases machine utilization and permits very high production rates.



Another advantage is in grinding thin parts which spring under a heavy cut. While circulating, the planetary face-type wheel covers the work surface area evenly. This reduces pressures on any one section—virtually to zero as the machine sparks out.

Mattison planetary head machines are designed to take advantage of self-dressing wheels. Once the wheel has been trued during initial setup, wear takes place evenly so that perfect flatness results. A post-process gaging system actuates an independent automatic feed for controlling size. Conventional pushbutton or manual operation of downfeed actuates rotation of the feed screw.

Mattison Machine Works, 545 Blackhawk Park Avenue, Rockford, Illinois.

Use postpaid card. Circle No. 42

New Bench Model Machine Precisely Finishes Small Parts

A new bench model Vibratory finishing machine has been announced by Almco, Queen Products Division, King-Seeley Corporation. The new model—No. VT-70—is especially suited for precision finishing of instruments, gears, missile components, electrical parts and other extremely small metal units that require precise uniform finishing.

The portable Almco model is 14" long, 11½" wide and 13¾" high. The tub has a capacity of ¾ gallon and can be removed from the top of the housing of the vibratory mechanism. The fixed vibration frequency of the VT-70 is 3300 which is designed to permit fast finishing action while maintaining high finishing standards.

The Model VT-70 employs the new concept of precision finishing through vibratory movement of the horizontal tub. The "scrubbing action" thus produced enables fine finishing to be accomplished with great efficiency. Parts can often be finished from 10 to 100 times faster than formerly possible with conventional finishing machines.

Almco, Queen Products Division, King-Seeley Corporation, Albert Lea, Minn.

Use postpaid card. Circle No. 43

Dust Collectors Feature New Automatic Filter Shaker

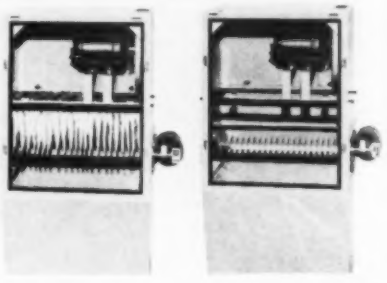
A newly developed, highly efficient automatic filter shaker is now available on all models of Torit cloth filter type dust collectors, the St. Paul, Minnesota, manufacturer has announced.

In addition to assuring peak operating efficiency by thoroughly shaking the filters each time the dust collector is used, the self-cleaning device eliminates the chance of a workman forgetting to manually shake the filters when the need arises.

The automatic shaker is powered by an independent electric motor mounted on the side of the collector. When the shaker bar is oscillated horizontally, its metal fins strike each cloth filter bag to free the dust particles and cause them to drop into the dust tray.

Shaking action begins automatically whenever the collector motor is turned off. After shaking the filters for two minutes, the mechanism shuts itself off and will not operate again until the collector has been turned on and off again.

Available with single phase, 110 or 220-volt, 60-cycle motors, the shaker can be used regardless of the voltage of the collector. Suggested list prices range from approximately $180 to $450, depending on the series of collector on which the automatic shaker is used.



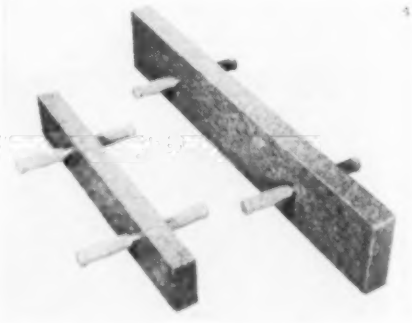
Manual shakers still are available on Torit cabinet cloth filter dust collectors, whose self-contained portable design permits flexibility and a wide range of applications. Cyclone separators and accessories also are manufactured by Torit.

Torit Manufacturing Co., 1133 Rankin Street, St. Paul 16, Minn.

Use postpaid card. Circle No. 44

Precision Granite Straight Edges Check Large Surfaces

Precision granite straight edges for checking the accuracy of large flat surfaces are now available in complete range of sizes.



From 2' to 6' long, they are made with one edge precision finished. The rectangular design permits a second edge to be precision finished as well, converting the straight edge into a parallel

with handles. These parallels can be furnished in matched pairs.

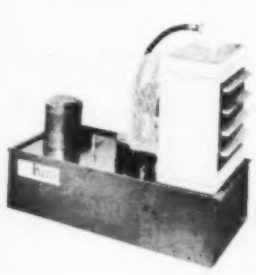
Handles can be removed for storage.

The Herman Stone Company, 1860 North Gettysburg Avenue, Dayton 27, Ohio.

Use postpaid card. Circle No. 45

Dual Pump Unit Cools and Circulates Coolant

A new Graymills unit consists of two pumping units, one that supplies coolant to the tooling area and a second that circulates the coolant through the radiator system to reduce the temperature. Use of this unit is said to reduce temperature by as much as 40°, though never below the ambient room temperature.



Completely portable, the Graymills unit can be used in conjunction with all types of machine tools. It is available in a range of sizes from 5 to 40 gallons, with gear or centrifugal pumps, can be installed quickly, and is virtually maintenance free, according to the manufacturer.

Graymills Corporation, 3705 North Lincoln, Chicago 13, Illinois.

Use postpaid card. Circle No. 46

New Lightweight Face Shield Features Low Cost

A new low-priced face shield scientifically designed for modern industrial use and protection is now being distributed by its manufacturer, The Fibre-Metal Products Company.

Designated "Feather-Lite F-90", the new face shield weighs only 3¾ ounces complete with a 6" x 11½" x 0.020"

window. It features replaceability of any of its low priced parts and enables the use of a great variety of windows or screens.

The Feather-Lite F-90 is priced at $2, and less in quantity.

The Fibre-Metal Products Company, 5th & Tilghman Streets, Chester, Penna.

Use postpaid card. Circle No. 47

WE'RE "OIL-FIRED-UP"

ABOUT THE NEW FM KILN!

Oil-fired up . . . **all** fired up . . . no matter how you say it, we're all excited about our unique new kiln* . . . the only **oil-fired** kiln of its kind in the United States, and another big step in our continuing effort to give you top performance from every FM Grinding Wheel and Segment.

Designed for us by Bickley Furnaces, Inc., in cooperation with our own engineers, and tested and proved in our plant, the new FM kiln gives us **exact** control of temperature and heat transfer during the entire firing cycle . . . gives **you** quality you can count on for every precision or rough grinding job. What's more, this exclusive process cuts the firing cycle for vitrified products by 20% . . . helps maintain the short delivery schedules you're accustomed to from Fuller Merriam.

Yes, we're oil-fired up to give you top quality in wheels and segments!

So if fast, precision grinding, uniform high quality, and short delivery figure in your cost and profit picture, contact your FM supplier today! Or send us your grinding application requirements.

*Bickley Car Bell Kiln with Diffusion-Aire Firing
Manufactured by Bickley Furnaces, Inc., Philadelphia

THE FM

FREE GRINDING WHEEL SELECTOR ON REQUEST!

FULLER MERRIAM CO. 72 Water St. West Haven, Conn. Telephone WEst 3-2501

Use postpaid card. Circle No. 234

Largest Continuous Rim One-Piece Metal Alloy Bond Grinding Wheel

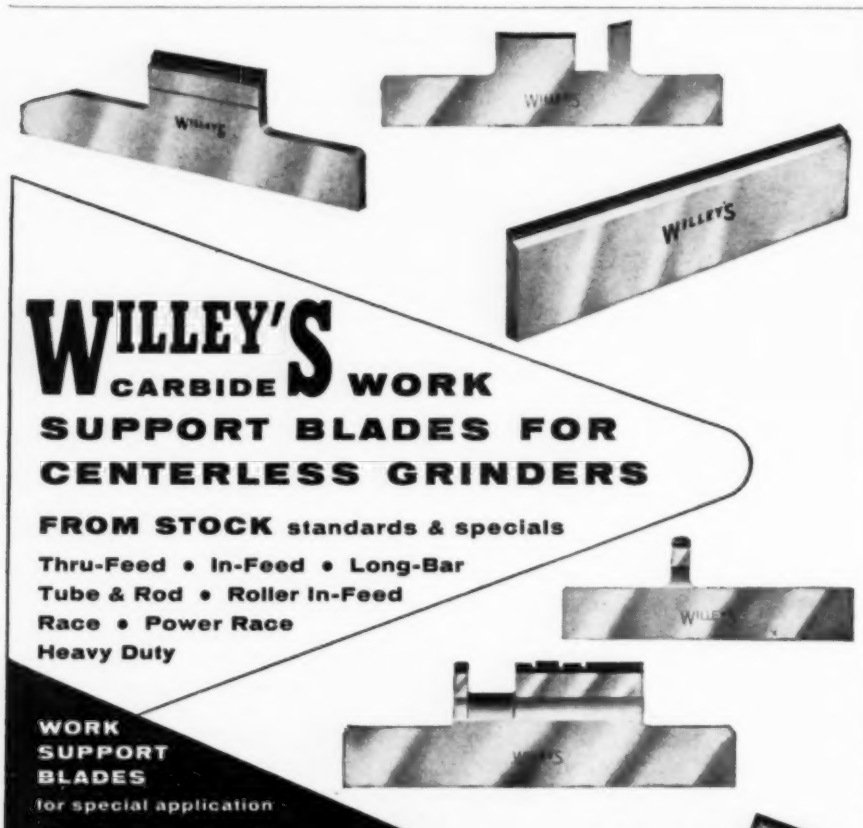
A continuous one-piece metal alloy bond diamond wheel, 24" in diameter has been developed and introduced by Action Diamond Tool Co. The wheel, according to the manufacturer, is the largest of its kind and was made by the company's patented pressure cast process.

Continuous rim wheels offer many operating advantages over segmented wheels such as increased wheel life, better finishes and stock removal performance. In addition, the design reduces edge chipping, friction and wheel cost.

Illustration shows a 24" diameter D2A2C (D2W) face grinding wheel. DIAI (DIT) wheels are also available for O.D. grinding applications up to and including 24" diameter.

Action Diamond Tool Co., 4545 W. Grand Avenue, Chicago 39, Illinois.

Use postpaid card. Circle No. 48


WILLEY'S
CARBIDE WORK
SUPPORT BLADES FOR
CENTERLESS GRINDERS
FROM STOCK standards & specials
Thru-Feed • In-Feed • Long-Bar
Tube & Rod • Roller In-Feed
Race • Power Race
Heavy Duty
WORK
SUPPORT
BLADES
for special application
Willey's have pioneered in the development and
manufacture of carbide work support blades. Seasoned
toolmakers with "know-how" build these tools for standard as
well as for special applications. Many centerless grinding operations
require special carbide tipped work support blades for work such as: multi-
diameter—angular—form—tapered or radius grinding.
RECONDITIONING SERVICE
Willey's regrind or carbide tip your worn out, chipped, broken or damaged
work support blades to original accuracy—smooth—straight and
parallel. For more than 20 years Willey's customers have used
this service, often having the same blade recondi-
tioned many times—a service and
saving available to
you too.
Write for complete
illustrated catalog
and price list
WILLEY'S
CARBIDE TOOL
COMPANY
1340 WEST VERNOR HIGHWAY • DETROIT 1, MICHIGAN
WOodward 1-9444

Use postpaid card. Circle No. 237

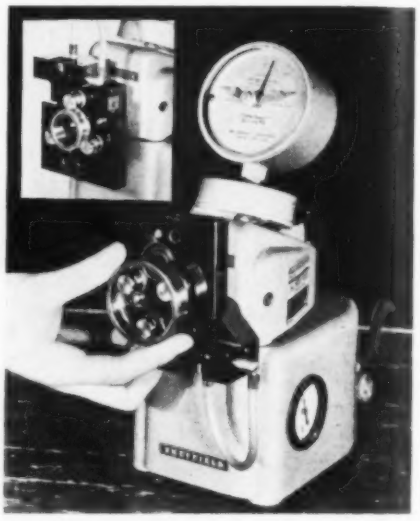
Race Diameter Gage Measures Both Inner and Outer Races

Bearing manufacturers as well as repair and overhaul facilities may well be interested in Sheffield's new low cost "Little Champ" Dialaire® 3-point inner and outer race diameter gage for these reasons:

The instrument measures both inner and outer races. The photo shows the gage checking an outer race and the photo insert an inner race.

Quick change tooling is used to accommodate bearing sizes 8mm to 50mm bore range. This is identical in design with existing Precisionaire® bearing matching gage tooling which can be used interchangeably on the gage.

The compact size of the "Little Champ" Dialaire, 6" wide x 7" deep is ideal for use at the grinding machine.



The instrument offers ample air gage amplification for close tolerance grinding. Each division on the Dialaire gage equals a "tenth".

The "Little Champ" Dialaire race diameter gage is a budget-priced air gage, designed especially for use in the production of a great variety of races and lot sizes.

The Sheffield Corporation, a subsidiary of The Bendix Corporation, Dayton 1, Ohio.

Use postpaid card. Circle No. 49

Light Production Work Holder Designed for Versatility

Developed for use in light production, a new "Erect-Your-Own" work holder has been introduced by the Wilton Tool Manufacturing Co., Inc.

This versatile production device is so designed that it may be quickly

and easily changed by the operator on the job, using only a screwdriver.

The kit, No. 391, contains two 18" perforated strips of ¼" aluminum plate, three 90° connecting angles, two toggle clamps, bolts and nuts. These parts may be purchased separately.

Wilton Tool Manufacturing Co., Inc., Schiller Park, Illinois.

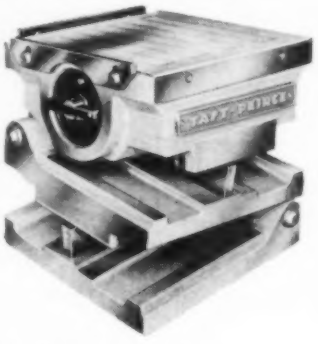
Use postpaid card. Circle No. 50

New Sine Angle Magnetic Chucks Speed Light Machine Set-Ups

Two new sine angle models have been added to the Taft-Peirce line of Superpower Permanent Magnet Chucks. They provide a time-saving trouble-free means for setting light machining or inspection jobs to either simple or compound angles.

On these models, a control knob on either side will quickly energize the magnetic surface, lightly, for easy positioning of the work, or for maximum grip. Lock screws, which are turned toward the operator, lock the plates at any angle.

Angle settings are obtained by the use of gage blocks, and a precision-ground step on the base plate makes it possible to set angles down to zero. Back and end stops, both readily adjustable, are provided on both models.



Both chucks feature a powerful rotary pack which is permanently magnetized and requires no wiring. Tool steel sine rolls are hardened and lapped, and positioned on five-inch centers within plus or minus .00015". They're alike, round and straight within a tolerance of .0005", and parallel with each other and the work surface within .00010". The precision-ground work surface is flat, square with the sides and parallel to the base within .0002".

Model 8866-1 is for simple angles, and Model 8866-2, for compound angles.

Taft-Peirce Mfg. Co., Woonsocket, Rhode Island.

Use postpaid card. Circle No. 51

Fabric Dust Collector Reclaims Dry Fines

A cylindrical fabric dust collector which can be shipped in small sections and assembled at the installation site has been introduced by American Air Filter Co.

The new Model B AMERjet reverse jet fabric dust collector is said to have low initial cost, low installation cost, and minimum maintenance performance.

Adaptable to any application requiring the reclaiming of dry fines, the unit is recommended for foundries and dry grinding operations.

The reverse jet cleaning principle reportedly enables the AMERjet to be sized at approximately one-fourth the number of filter bags normally required.

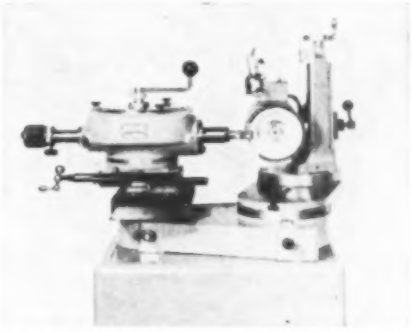
American Air Filter Company, Inc., 215 Central Avenue, Louisville 8, Ky.

Use postpaid card. Circle No. 52

New Toolroom Grinder Grinds, Makes Variety of Tools

A new grinding machine known as the Multi-Spiral universal grinder is said to grind quickly and easily a wide variety of cutting tools—end mills, taps, reamers, core drills, side milling cutters, and step drills, for example.

In addition, the manufacturer claims the new grinder can grind from the solid such items as end mills, step drills, reamers, and counterbores, as well as other similar tools.



Also available is a Model 1000 Multi-Spiral grinder, said to be capable of many of the operations described for the universal model.

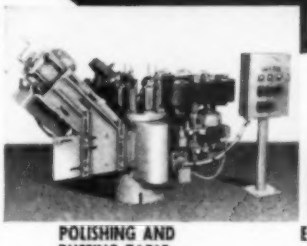
Spiral Step Tool Company, 5400 N. Damen Avenue, Chicago 25, Illinois.

Use postpaid card. Circle No. 53

MURRAY-WAY SPECIALIZED FINISHING EQUIPMENT

JUNIOR FLAT POLISHER— versatile production unit for economically grinding, polishing, or deburring flat surfaces.

HORIZONTAL-PLATEN CONVEYOR built to fit your exact requirements.



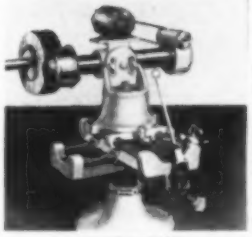
POLISHING AND BUFFING TABLE— small dial table has abrasive belt head and buffing head for spiral aluminum shapes

ECONOMICAL LATHE— stripped of many unnecessary "frills" to keep costs to a minimum.

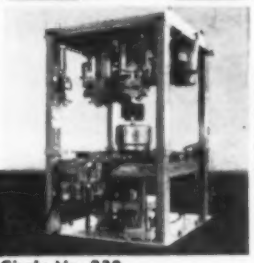
ROLLER COATER— a trouble-free, precision unit that coats one or both sides of a sheet.

...IMPROVES QUALITY, REDUCES COSTS FOR METAL PRODUCTS MANUFACTURERS

Polishing, buffing, grinding, filtering, deburring, materials handling . . . whatever your problem, Murray-Way equipment will do the job better and more economically. Fresh ideas based on a solid background of experience, enable Murray-Way's fine engineering and production departments to handle any and all of your production problems— large or small. The BETTER WAY is the MURRAY-WAY.



HAN-D-MATIC— low cost machine with interchangeable components for buffing, grinding, and deburring.



WIRE BRUSH MACHINE— deburrs automatic washer and dryer basket holes prior to painting.

MURRAY WAY

MURRAY-WAY CORPORATION
P.O. BOX 180 - MAPLE RD. EAST
BIRMINGHAM, MICH

Use postpaid card. Circle No. 238

New Vitrified Bonds Permit Deeper, Heavier Cuts

Deeper, heavier cutting and faster production with a cooler cutting surface is now possible with the new K and KP vitrified bonds for aluminox grinding wheels and segments developed by American Emery Wheel Works.

The K bonded wheel is ideal for form work and where the wheel must hold its corners with a minimum of dressing. This bond is compounded to resist loading.

The KP bonded wheel features controlled porosity and is specifically designed for high production and heavy cuts. This bond is exceptionally tough and durable for fast stock removal.

American Emery Wheel Works, 3 Richmond Square, Providence 1, R. I.

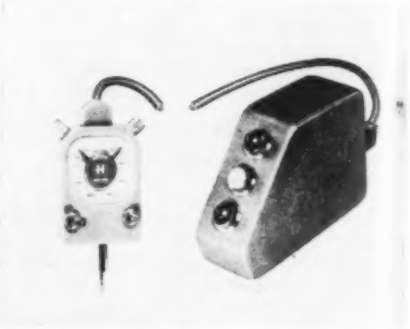
Use postpaid card. Circle No. 54

Electric Indicator Signals "Out of Tolerance"

An electric indicator which signals "out of tolerance" is now offered in the Kwik-Chek gage line marketed by the Industrial Division, Hamilton Watch Co.

In this new gage, an electric signal is generated whenever established tolerance limits are exceeded. This signal can be used to turn on lights or for automatic control.

By the addition of an adapter, the light box can be converted to a summarizing box for up to six electric indicators when gaging multiple dimensions. With this arrangement, an out of tolerance condition will be signaled by



the "over" and/or "under" light. If all dimensions are within tolerance, the "good" light will signal.

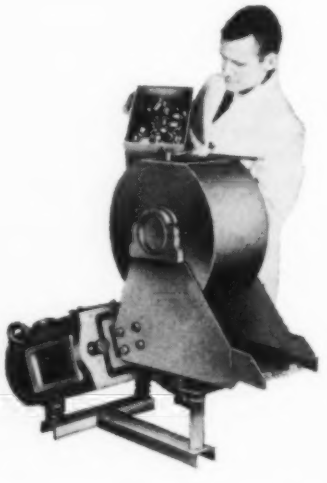
Industrial Division, Hamilton Watch Company, Columbia Avenue, Lancaster, Pennsylvania.

Use postpaid card. Circle No. 55

Vibratory Barrel Features Electromagnetic Drive

Syntron Company has introduced what is reported as a new concept in the art of parts finishing with the development of vibratory barrel tumbling machines featuring electromagnetic vibratory drives for deburring, cleaning, descaling, and similar finishing jobs.

Powerful, controlled, directional vibration keeps both parts and media agitated and constantly working 100% of the time. This constant vibration



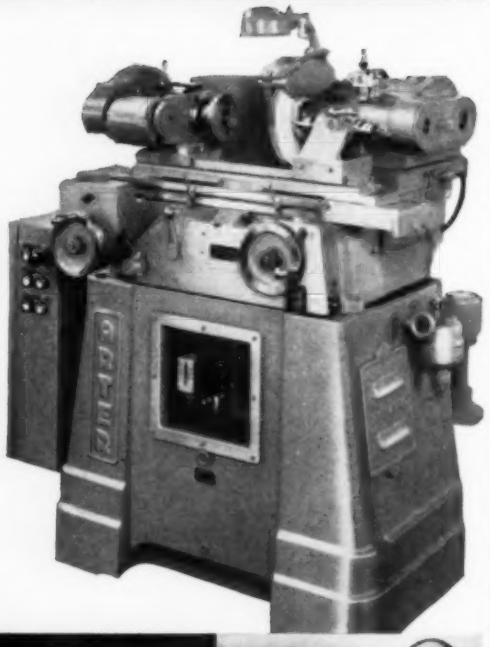
assures more thorough working of hard-to-get-at places and shielded areas. The amplitude of vibration can be instantly varied, while the same frequency of 3600 vibrations per minute is maintained.

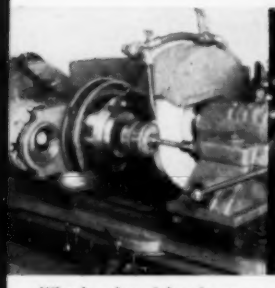
These self-contained, compact units are available in three models with .4, 1 and 6 cu. ft. barrel capacities; larger models will be available in the near future. They are designed to reduce parts handling—incorporating a screen

Best buy for toolroom or small-capacity production grinding

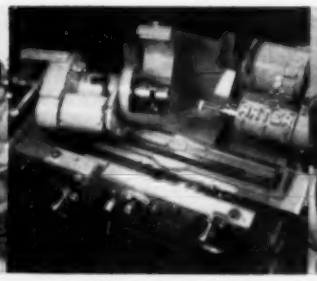
The Sundstrand-Arter Model 103 can be arranged for cylindrical or internal grinding. Wheel heads swivel 15 degrees either side of center — work head swivels 90 degrees. It's ideal for toolroom or production work where a small-capacity machine is needed, or for supplementing larger grinders when work piles up. Multiple-jaw chucks, faceplates, and other chucking accessories can be quickly attached to spindle nose.

Sundstrand-built to highest precision standards, this moderately priced grinder has a complete hydraulic movement of table and wheel head. Maximum capacities: external—3" OD, internal—3" ID.





Wheel and work head arranged to grind cylindrical work.



Internal grinding head with work head swiveled.

Work head swiveled 90 degrees to grind a gear shaper cutter.

For complete information, write for Bulletin 918.

MARK OF RELY-ABILITY

SUNDSTRAND ARTER

SUNDSTRAND MACHINE TOOL
BELVIDERE, ILLINOIS
Division of SUNDSTRAND CORPORATION
Use postpaid card. Circle No. 239

cover and hose connection for flushing out compounds and a screen trough to separate the parts and media.

Syntron Company, 1253 Lexington Avenue, Homer City, Pennsylvania.

Use postpaid card. Circle No. 56

Large Dust Collector Expands Hammond's Line

A new and larger Cyclone Type Duskolector, the DK-1055, is the latest addition to the Hammond line.

Features include a direct driven self-cleaning fan unit powered by a 7½ HP, 3600 rpm motor which gives a 3500 cfm rating. Regular inlet size is 10" diameter. Multiple inlets are available to accommodate ductwork to a number of dust sources.

This new model comes equipped with two 55 gallon drums mounted on casters for easy disposal of dust, chips and dirt. Only the very light dust particles are exhausted outside. The 55 gallon drum arrangement is also available for the smaller Hammond models.

Hammond Machinery Builders, Inc., 1651 Douglas Ave., Kalamazoo, Mich.

Use postpaid card. Circle No. 57

Single Bridge Size Safety Eyewear Simplifies Inventory, Fitting

Bausch & Lomb has introduced a new line of safety eyewear featuring a one-size saddle bridge for all three eye

sizes and available in the two most popular colors: flesh (Model Y-15) and two-tone brown and crystal (Model T-16).

Because a full range of bridge and eye sizes is required for prescription safety glasses, these frames are not recommended for such use.

These glasses are available with Bal-SAFE lenses in clear or Ray-Ban shades 1, 2, 3, or in clear Enduron plastic. Side shields can be quickly attached.

Bausch & Lomb, Rochester 2, N. Y.

Use postpaid card. Circle No. 58

Oversize Granite Surface Plates Are Designed for Heavy Manufacturing

A special line of oversize granite surface plates for precision measurement of large parts has been put on the market by The Herman Stone Co.

Designed to meet the needs of heavy manufacturing, these plates are constructed entirely in one piece and finished with an automatic machine propelling lapping plates weighing as much as two tons.

A complete range of surface plate sizes up to 50′ long is available. The photo shows a 20′x10′x22″ surface plate.

The Herman Stone Company, 1860 North Gettysburg Ave., Dayton 27, O.

Use postpaid card. Circle No. 59

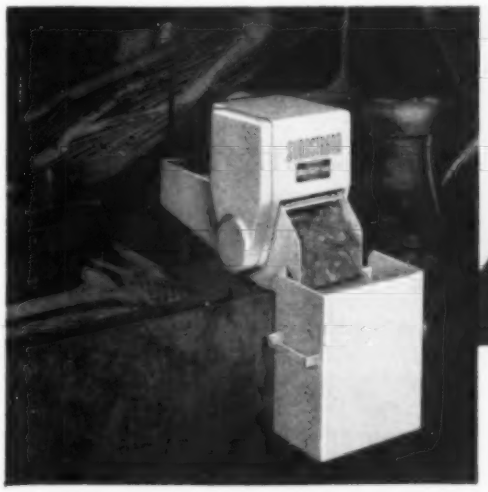
In no time at all, you can install a Sundstrand coolant separator

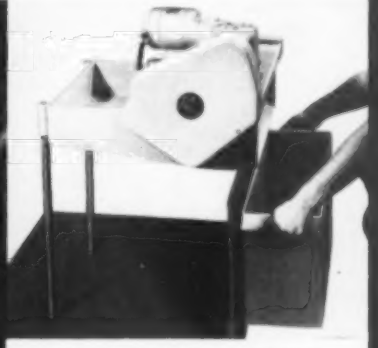
. . . to lengthen wheel life, improve finishes, reduce downtime, eliminate sump cleaning, and the number of coolant changes.

Installation is easy, separator can be placed right on open coolant tanks in most machines — no repiping or fitting necessary.

Maintenance is quick and easy. Separated material is deposited into a sludge pan which can easily be removed for cleaning in a few seconds, without any tools. No more sumps to be cleaned out.

You will save money and improve the quality of your grinding, honing, and gear shaving operations with Sundstrand magnetic coolant separators. They're available in four capacities: 25, 50, 75, and 100 gpm.





Permanent alnico magnet drum revolves against coolant flow — attracts and separates magnetic particles quickly and easily. Sludge pan is removed in a few seconds.

Bulletin A368 gives complete data. Write for your copy today.

MARK OF RELY-ABILITY

SUNDSTRAND POWER-GRIP

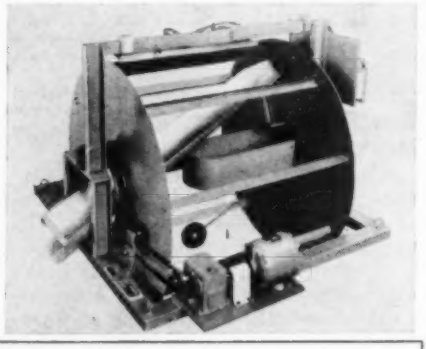
SUNDSTRAND-AMERICAN BROACH
ANN ARBOR, MICHIGAN
Division of SUNDSTRAND CORPORATION

Use postpaid card. Circle No. 240

Compact Rotary Filter Has Large Capacity for Space Used

A compact, new strainer type rotary industrial filter, providing unusually large filtering capacity in proportion to floor space occupied, is now being produced by Murray-Way Corporation.

Known as "Model No. 10", this automatic filter is made up of eight simplified, screw-mounted screens on a rotating drum. (These screens have been removed in the enclosed skeletal photograph.)



The contaminated fluid is carried by gravity down the entrance chute and into the turning filter drum. As the filtered fluid drains to the tank below, the sludge-coated screen rotates, constantly moving a clean filtering area into position. Special reciprocating air nozzles, located at the top of the filter drum, "air-peel" the caked contaminant from the screen into the exit chute.

Air pressure requirement is 40 to 60 p.s.i., and air usage is approximately 16 cubic ft. free air per minute when filter is in continuous use. An optional float switch is available to turn the drum only when contaminant cake restricts filtering, thus conserving on air usage. An air pressure regulator, gauge, and lubricator are provided.

Murray-Way No. 10 Filters may be used separately or in tandem, to service one machine or as a central filter for many machines.

Murray-Way Corporation, P. O. Box 180, Birmingham, Michigan.

Use postpaid card. Circle No. 60

Belt and Disc Finishing Machine Performs Many Finishing Jobs

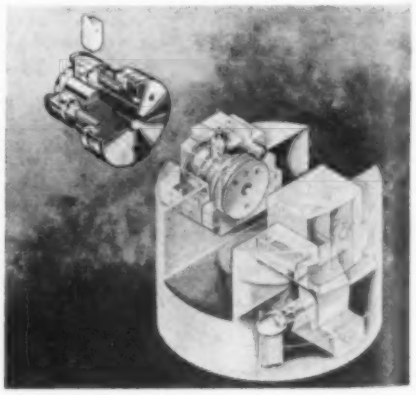
A combination finishing machine recently brought out by Walker-Turner Division, Rockwell Manufacturing Company, is said to be capable of performing 90% of all shop finishing operations. The unit is equipped with a 4" x 52½" belt and a 12" abrasive disc operating from a common motor.

Walker-Turner Division, Rockwell Manufacturing Company, 400 North Lexington Ave., Pittsburgh 8, Pa.

Use postpaid card. Circle No. 61

Heavy-Duty Power Chuck Indexes Under Full Pressure

A new heavy-duty power chuck available in body diameters from 12" thru 36" and in all intermediate diameters is said to let the operator index manually without touching the work or releasing the pressure.

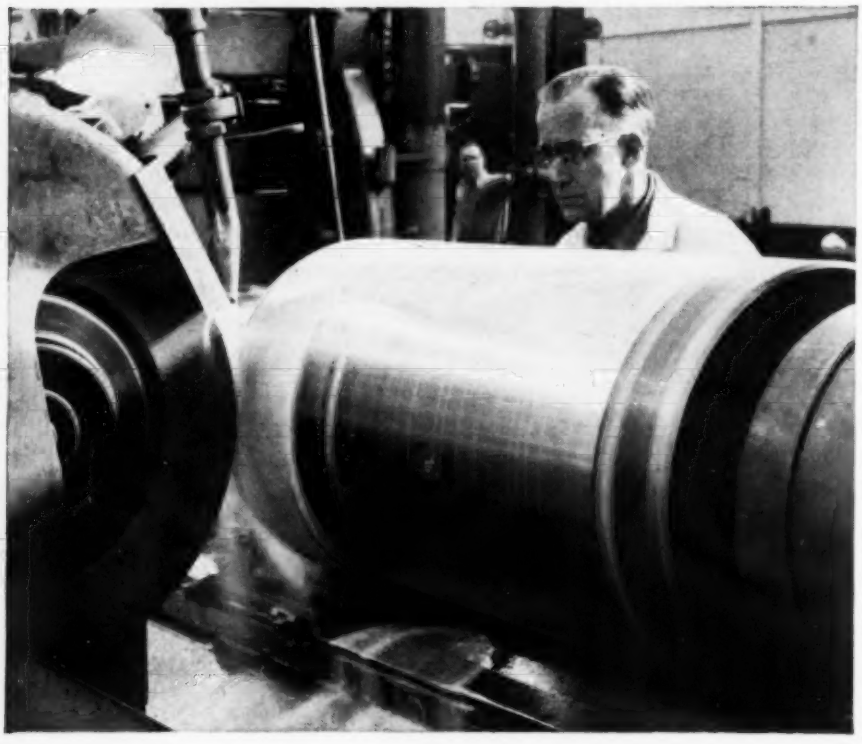


One or both jaws can be furnished with indexing mechanisms. As a result, the operator can index more positions and smaller index angles.

The Skinner Chuck Company, 95 Edgewood Avenue, New Britain, Connecticut, Dept. IC-59.

Use postpaid card. Circle No. 62

Where the wheel meets the steel . . .



"Jobs change—but coolant doesn't with W&B E-55 in this Norton Grinder!"

"We can never tell what tough job is coming up next in this cylindrical grinder," says Mr. Ellis E. Carlson, Jr., General Foreman of Norton Company's Central Service Department. "It may be stainless (like the job shown here) or any number of nonferrous metals, alloys or steels.

"We do know that, no matter what the metal, W&B Grinding Coolant E-55 will do the job! It gives us good cooling; keeps the wheel clean and free cutting. And we don't have to clean the tank as often.

"On top of that, E-55 doesn't foam; settles chips fast; and gives good rust protection. It makes a clean, transparent coolant that doesn't smell bad and is easy on the hands." What more could you ask?

Send for a FREE working sample of W&B E-55! Write coolant tank size, plus make and type of grinder and typical jobs . . . on company letterhead. Mail to The White & Bagley Co., 88 Foster Street, Worcester, Mass.

W-B INDUSTRIAL LUBRICANTS

THE WHITE & BAGLEY CO.

Worcester, Massachusetts • Detroit, Michigan

Originators of Grinding Lubricants

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Measure...
Sort...
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MICROtolerance Measurements

High Reliability High Speed Sorting

Positive Continuous Machine Tool Control

For complete information on the Versatile MICRO*trol*® type 160 line of Electronic Gaging and Control Equipment...

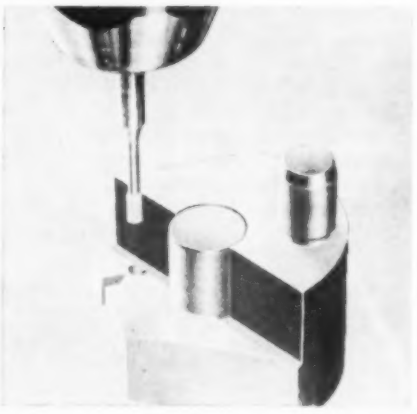
Call your Cutler-Hammer Sales Engineer or write:

AIRBORNE INSTRUMENTS LABORATORY
DEER PARK, LONG ISLAND, NEW YORK
A DIVISION OF CUTLER-HAMMER, INC.

Use postpaid card. Circle No. 242

New Diamond Mandrels Grind Small Holes

Precision grinding of small diameter holes in all types of material, it is claimed, can be done rapidly with a new diamond mandrel recently introduced. The shanks are hardened and ground to a very close limit. Diamonds are mounted under controlled atmospheric conditions by a patented new electronic method.



The sharpest edges of the diamonds protrude on the mandrel and make it extremely helpful in grinding even the hardest heat sensitive steels. Holes as small as .022" can be successfully ground accurately and rapidly. In addition to their wide usage on jig grinding equipment, they are used for precision internal grinding. The new mandrels are ideal for carbide drawing and header dies. These time and money saving tools are available in a complete range of sizes from .018" to ¾" diameter.

Precision Diamond Tool Company, P. O. Box 274, Elgin, Illinois.

Use postpaid card. Circle No. 63

New Mechamatic Unit Has Two Independent Heads

A new heavy-duty, 75 hp Mechamatic unit, the MM-2—High Speed Model No. 3000-3, is a two-spindle unit designed for low production of a multiplicity of parts and/or high production of a single component.

It has the specific advantage of having two independently operated spindle heads which permit the operator to service one spindle while the opposite spindle is working. The unit can also

SEND FOR CATALOG G

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RAISE GRINDING PRODUCTION

FOR $2.70

A typical Desmond Huntington grinding wheel dresser costs about $2.70 from your distributor, yet it substantially increases grinding production, makes wheels cut better, and lowers grinding costs. By dressing all your grinding wheels regularly you remove inefficient dull particles and loaded metal, expose a fresh new grinding surface. Your Desmond distributor can furnish the exact model you require. Ask his advice.

The only complete line of grinding wheel dressers and cutters

Desmond

The Desmond-Stephan Mfg. Co.
Urbana, Ohio

Use postpaid card. Circle No. 243

NEW!

metalloid Electrogrind

FOR

RUST FREE ELECTROLYTIC GRINDING

NOW, FOR THE *FIRST* TIME, A NON-TOXIC, RUST-FREE, HIGH EFFICIENCY WATER SOLUBLE LIQUID AVAILABLE FOR USE IN YOUR ELECTROLYTIC GRINDER.

It is no longer necessary to tolerate costly machine repairs and limited use of your equipment because of rust and corrosion caused by electrolytic fluids which contain harmful materials. ELECTROGRIND will not deposit heavy salt on machine or parts. Operators appreciate ELECTRO-GRIND because it *does not* irritate their eyes or skin.

Arcing is greatly reduced over ordinary electrolytic solutions made from powders. Less arcing means *longer wheel life* and *better surface* finish.

COSTS MUCH LESS TOO!

Metalloid manufactures premium cutting fluids for all types of metal machining and grinding.

EASTERN DISTRIBUTOR OF *New* **KOOLMIST** *the world's finest* **MIST** Coolant System
Mfg. by Lloyd Tool Corp., Pasadena, Calif.

METALLOID CORP.
HUNTINGTON, INDIANA

Use postpaid card. Circle No. 244

be supplied with spindle stations interlocked.

The parts are mounted on spindle fixtures, air-operated, which are submerged while rotating in a fluid abrasive mass which simulates a form-fitting grinding wheel. Parts rotate at about 2000 sfpm.

At a 15-second time interval, the illustrated machine will produce 240 parts per hour at 100% efficiency.

Mecha-Finish Corporation, 304 West South Street, Sturgis, Michigan.

Use postpaid card. Circle No. 64

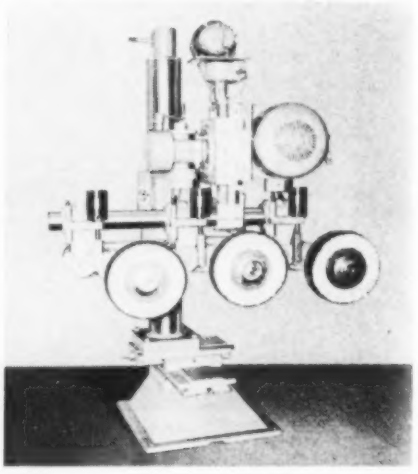
New Triple Head Buffing Lathe Reduces Floor Space Required

A new compact adjustable triple head buffing lathe that provides three buffing operations in a minimum amount of floor space is now available from Acme Manufacturing Company. This design permits the use of 3 buffing heads in a space normally required for 2 conventional single heads.

The buffing lathe is ideally suited for use with automatic high production straight line buffing machines where a large number of buffing heads are required.

The adjustable lathe is equipped with floating heads operated by individual air cylinders to maintain uniform part buffing pressure. Each head can be individually adjusted for float.

The heads can be easily adjusted from a vertical to horizontal position. The three buffing heads can be individually set at separate speeds through a special pulley arrangement.



An Acme standard interchangeable power drive unit raises and lowers the buffing heads, adjusts the in-and-out slide and provides automatic buffing wheel wear compensation in pre-set cycles and feed amounts. Wheel wear compensation can be provided manually. However, the automatic feature cuts machine downtime for manually adjusting heads to compensate for wheel wear.

The machine occupies a floor space approximately 5-ft x 5-ft and is 7-ft high. Center distance between heads is 20-inches. Motor horsepower of the lathe will vary from 10 to 25 depending on the buffing application.

Acme Manufacturing Company, 1400 East Nine Mile Road. Detroit 20, Mich.

Use postpaid card. Circle No. 65

WALLS TU-WAY BELT SANDER

Full 1/3 h.p. G. E. Motor

USE IT EITHER WAY

At last, a top quality industrial sander that provides all the most wanted features — yet sells for so little..

complete with cord, plug, switch ready to use **$89.95**

Illustrated Literature on Request
A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

Use postpaid card. Circle No. 245

Optical Aids Kit Contains Fundamental Measuring Tools

Bausch & Lomb Incorporated has announced what it terms the most complete set of optical tools ever assembled in a single kit. Originally designed for

B & L personnel, the kit is now marketed for its wide applications in the industrial and engineering fields.

It brings together the components of fundamental measuring and examination tools and offers them in a single package, at a price below that of the units purchased separately.

The kit is particularly recommended for quality control and inspection work, since its components provide flexibility to meet changing job requirements. The case with full complement of parts weighs about 16 pounds.

Magnifications vary from 7x to 80x, with reticles and measuring scales ranging from .001" to .005".

Bausch & Lomb Inc., Rochester 2, New York.

Use postpaid card. Circle No. 66

Portable Scale Measures Head Weights on Swing Frames

A compact, portable scale which converts hydraulic pressure to weight on a dial gage has found primary usage in measuring the head weights on automatic and swing free grinding machines used in billet grinding.

The purpose of the unit is to provide a small portable scale to indicate

weights up to 1500 pounds. Scales can be supplied, on order, with any of the following ranges: 0 to 600 pounds; 0 to 1000 pounds; and 0 to 1500 pounds.

The scale is approximately 6" high and 3" in diameter. It weighs about ten pounds.

Acme Abrasive Company, 24200 Marmon, Center Line, Michigan.

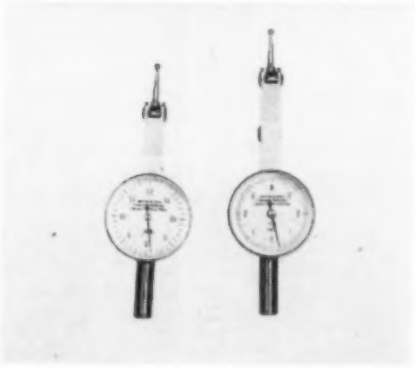
Use postpaid card. Circle No. 67

Test Indicators Combine Features of Other Instruments

The Mueller 300 series test indicator is said by the maker to combine desirable features of other present-day test indicators.

The Mueller G301 and the G303 Indicators are available in .001 and (subdivided in .0005 by a dot), also in .0001 Graduation; available in M/M.

The movement of the Indicator is always clockwise when changing direction of pressure on the contact point. The contact point will not slip and operates in a 186 degree arc. 1/32 contact points are available in carbide and



hardened tool steel; contact points are threaded for interchangeability.

Mueller Gages Co., 1052-1058 North Allen Avenue, Pasadena, Calif.

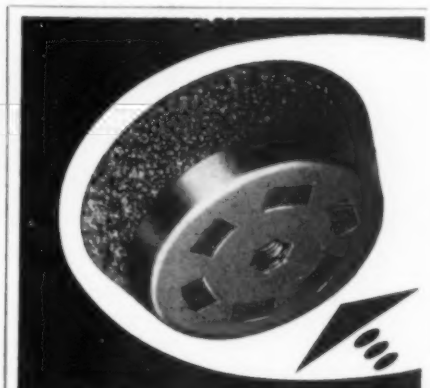
Use postpaid card. Circle No. 68

Linear Vernier Calipers of Stainless, Hardened and Lapped

A new line of stainless steel linear calipers is claimed by the maker to be ideal for tool makers, machinists and inspectors.

The vernier scale is deeply engraved for maximum contrast against the satin finish scale for easier reading. This reduces fatigue and the chance of human error.

A micro-positioning feature simplifies adjustment of the measuring head for faster, more accurate measurement.



BUILT-IN SAFETY

FOR SAFETY-FIRST PERFORMANCE

Test results show that the safety factor is increased up to 75% when CARROLL SAFETY-GUARD-INSERTS are molded into your cup wheels. They conform to A.S.A. Safety code cup-guard requirements.

SPECIFY, ORDER and TRY Carroll's safety-guard-inserts now being used by over 50 grinding wheel manufacturers.

SPECIALISTS IN ALL TYPES OF GRINDING WHEEL METAL INSERTS

PM INC

CARROLL
PRESSED METAL, INC.
133 DEWEY ST.
WORCESTER 10, MASS.

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For increased output and accuracy, finish your tools and gages with HYPREZ DIAMOND COMPOUNDS

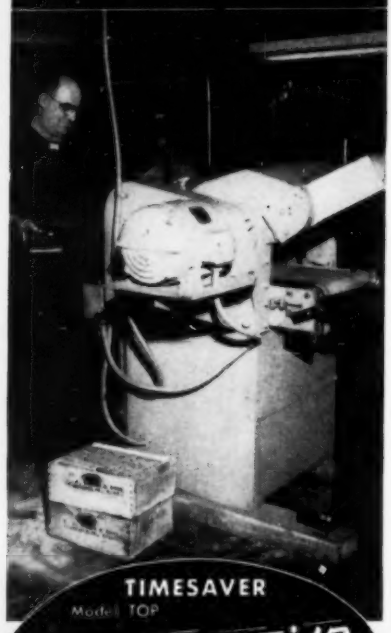
Virgin Diamond particles, graded in our own laboratories, are uniformly dispersed in the exclusive Hyprez vehicle for maximum cutting action. They produce finer results faster on every finishing job... Your nearby Hyprez distributor will help you solve any lapping or polishing problem that may arise.

Write for free demonstration or technical bulletin No. HG-80

HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. Dearborn St., Chicago 5, Illinois

Use postpaid card. Circle No. 247

"650 metal stampings deburred in 10 minutes"



TIMESAVER
Model TOP
SPEEDBELT 12
ABRASIVE BELT SANDER

V. A. BOKER & SONS, Minneapolis, Minn., manufacturer of precision metal stampings reports:

"We processed 675 metal stampings using a Speedbelt 12 and 2 men in 1 hr. 40 mins. or 3 hrs. 20 mins. of direct labor charged against the job. By old deburring methods this run would have taken in excess of 20 hours. Another run of 650 metal stampings was completed in 10 mins., or 20 mins. direct labor compared to 4 hrs. by former deburring methods. These runs are typical of the savings in production time we have made on this type of work. We also find we are achieving a much better finish as well."

TIMESAVER "SPEEDBELT" SANDERS CAN HELP CUT YOUR PRODUCTION COSTS . . . TOO!

V. A. Boker & Sons' experience is typical of the many installations where versatile, low-cost Timesaver "Speedbelt" Sanders have replaced slow, costly deburring, finishing and polishing methods. Timesaver Sanders are built in 12", 18", 24", 38", 50" and 54" models . . . a size and type to solve most polishing, finishing and deburring operations on solid or perforated aluminum, stainless steel and other metal sheets, bars and blanks.

INVESTIGATE the advantages of these amazing machines and hi-speed abrasive belt operations for your shop. Write for literature today.

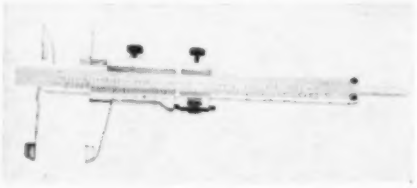
TIMESAVER SANDERS
Box 7446, Robbinsdale Station
Minneapolis 22, Minn.
Dept. R-8

Use postpaid card. Circle No. 248

NEW EQUIPMENT *continued*

Ample length of the Vernier head insures positive scale alignment of the head and the scale beam for absolute freedom from distortion.

The calipers feature a double vernier scale which reads either 1/1000" or 1/128", with an accuracy of 1/1000". The No. 244 Caliper (photo attached)



has a 6" scale with effective measuring range of 5". Its double jaws permit convenient inside or outside measurement from the same scale.

All Calipers are supplied in a durable, transparent, rigid plastic case.

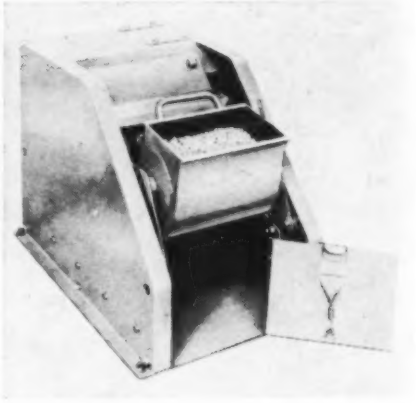
Titan Tool Supply Co., Inc., Box K, 1419 Hertel Avenue, Buffalo 16, N.Y.

Use postpaid card. Circle No. 69

Vibratory Finisher Achieves Rapid Finish—No Impingement

A tub-type vibratory finisher built by Vibraslide, Inc., is reported to have achieved rapid finishing without impingement damage to work pieces, as a result of controlled, positive elliptical movement of the work container, an innovation in equipment of this type.

Amplitude is positive, generated by mechanical cam action, and is easily adjusted without disassembly of the unit. Once adjusted, it does not vary as



a result of changes in frequency or weight of load, and is not affected by the reaction of the suspension system.

The tub-type work container is easily removed from the machine without disassembly of other components, and all sub-units are easily accessible.

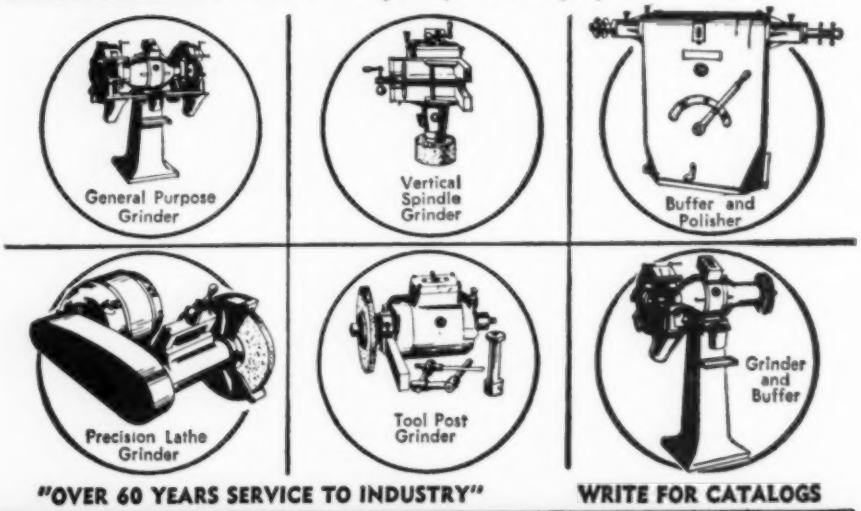
The new Vibraslide vibrafinisher is offered in capacities of 1, 5 and 10 cubic feet, and larger capacities are available on order.

M-F Equipment Company, Newark, New Jersey. • • •

Use postpaid card. Circle No. 70

The Answer... TO INDUSTRY'S DEMAND FOR QUALITY, EFFICIENCY AND LOW COST ECONOMY
UNITED STATES ELECTRICAL
GRINDERS-BUFFERS

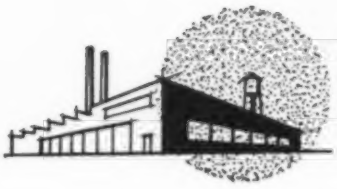
An investment in better, faster, production through the use of tools expertly designed and conscientiously crafted for your particular purpose.



"OVER 60 YEARS SERVICE TO INDUSTRY" WRITE FOR CATALOGS

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

Use postpaid card. Circle No. 249



News from the Industry

Kaydon Completes Gage Lab

Completion of a new quality control laboratory has been announced by The Kaydon Engineering Corp., providing the firm with precision gage setting and measuring facilities said to be among the best in the nation.

Kaydon's large size bearings present many unusual gaging problems. Since the diameter tolerance for such large bearings is usually .002", each individual part must be held to extremely close tolerance.

Each degree difference between the gage and the bearing induces an error of .000007" per inch of bearing diameter. On a 160" bearing the error would total more than .001", or half the allowable tolerance.

New Company Formed to Market Acme Equipment in England

A new company named Acme-Efco Ltd. has been formed to market the complete line of Acme polishing and buffing machines. Acme-Efco Ltd., is owned jointly by Acme Manufacturing Co., of Detroit, Michigan, leading manufacturers of automatic buffing and polishing machines for over 50 years; and Electro-Chemical Engineering Co., Ltd. of Sheerwater, Woking, Surrey England, one of the leading automatic electro-plating equipment manufacturers and plating process development companies in England for more than 21 years.

The new company, second European company formed by Acme in the last five years, has been established to manufacture and sell to the English industrial and metalworking market the complete line of Acme machines.

Houghton Opens New West Coast Plant

To handle its increasing West Coast business, E. F. Houghton & Co. has opened a new plant at 54 Tanforan Avenue, South San Francisco. Industrial oils and chemicals formerly manufactured at Houghton's plant at 1500 Davidson Avenue, San Francisco, are now being supplied from the new facility.

Cushman Reduces Prices on Soft Blank Top Jaws

Substantial price reductions on their line of soft blank top jaws have just been announced by The Cushman Chuck Co., Hartford, Conn.

In addition to both standard and extra high top jaw blanks, Cushman also offers a size range of long pointed soft blank top jaws for medium and heavy duty chucks. Cushman blanks are made of a carburizing grade of hardenable steel and can be machined to fit particular workpiece requirements or used soft as supplied. Use of formed top jaws in place of regular top jaws eliminates expense and lengthy set-up time required by jigs and fixtures.

Bausch & Lomb Changes Name

On July 1, 1960, Bausch & Lomb Optical Co., Rochester, N.Y., became officially Bausch & Lomb Incorporated. The new name, recently approved by company stockholders, recognizes the fact that B&L is no longer restricting its research and manufacturing interests to the field of optics alone.

Wanskuck Company Buys Production Machine Co.

John A. Wilson, President of the Wanskuck Co., Providence, R. I., announces that his company has purchased the Production Machine Co., Greenfield, Mass., manufacturer of centerless grinders and polishing machines. The firm, employing about 60, will continue to operate in Greenfield with its existing personnel. Anthony J. Spada has been appointed general manager of the firm to replace the late Raymond A. Cole.

The Production Machine Co. produces grinding, polishing and buffing machines using abrasive belts. Its acquisition is the third by the Wanskuck Co. since this large textile manufacturer was purchased by the New England Butt Co. of Providence in 1955. Soon thereafter, New England Butt Co. became a division of Wanskuck, and Wanskuck ceased its textile operations.

ACCO Moves Chicago Office

In order to serve the midwestern trading area better and faster, the Chicago district sales offices and warehouse facilities of the American Chain & Cable Company, Inc., have been moved to larger quarters at 2040 North Hawthorne Avenue, Melrose Park, Illinois.

The new structure contains some 48,000 square feet of warehouse area and an office area of 7,600 square feet for a staff of more than 50 employees.

Bay State's Raised Hub Wheel Proves Efficiency

A manual off-hand grinding test on SAE 1020 hot rolled steel bar stock showed that Bay State's "Blue Flash" raised hub disc-wheel was able to increase production by providing twice the efficiency, better than 10% faster cutting rate and about twice the life of the previous method.

In this 30-minute test of grinding wheels on the 1½-inch by 1¼-inch thick bar, the aluminum oxide, coarse grain, fairly hard grade wheel made by the Westboro, Mass., firm was used. This test serves to substantiate other tests which have been conducted on the "Blue Flash."

A large West coast foundry now uses Bay State's 10 x ⅛ x 1 "Blue Flash" cut off wheel, which it finds to be superior to anything previously tried for heavy off-hand portable cutting of nodular iron risers. In a test conducted there, Bay State's wheel showed a 30% longer life.

Ex-Cell-O Acquires Magna-Sine

Ex-Cell-O Corporation of Detroit has arranged to purchase the sine plate business of the Omer E. Robbins Company according to an announcement by H. Glenn Bixby, Ex-Cell-O president.

Production and sale of these sine plates are to be handled at Ex-Cell-O's Greenville, Ohio plant under the Magna-Sine trade name. Russell P. Scholl, Sales Manager of Bryant Gage products at Greenville, will be in charge of Magna-Sine sales.

Skinner Chuck Acquires Horton Line from United-Greenfield

Paul K. Rogers, Jr. president of The Skinner Chuck Company, New Britain, Conn., has just announced Skinner's acquisition of the Horton chuck line from the Geometric-Horton Division, United-Greenfield Corporation, New Haven, Conn. Horton chucks are presently manufactured in the Geometric-Horton plant in New Haven.

A major part of the Horton line includes large-size chucks up to 60 inches, and a line of electric chucks, types and sizes not manufactured by Skinner.

ACCURACY
.0002 T.I.R.

.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

Clip ad to your letterhead and send for Literature

K. O. Lee Company, Aberdeen, S. D.

Use postpaid card. Circle No. 250

DUSTKOP "520"
designed to collect dust from single machines

portable—easily installed

DUSTKOP STOPS DUST

Self-contained Dustkop models, like the "520," are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

Write for illustrated literature . . .
46 models to choose from!

NEW DUSTKOP AUTO SHAKER shakes filters AUTOMATICALLY

AGET manufacturing company
1380 E. Church Street, Adrian, Michigan

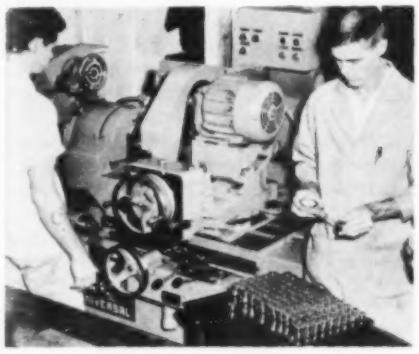
ask for details

Use postpaid card. Circle No. 251

Universal Grinder Covers Wide Range

In a job-shop operation where part runs may vary from one to 500 pieces, a versatile internal grinder is a necessity—if it doesn't require too much capital investment.

Selco Grinding Company, Gardena, California, handles all kinds of precision grinding—straight or tapered I. D.'s, O. D.'s, even rotary surface grinding of flat, convex or concave surfaces—with a new Heald 273A universal grinder.



Checking the I.D. of a typical production run lot, while the operator runs the machine.

The $12,000 grinder—priced for less than a similar unit 12 years ago—holds tolerances within .000050" on special short runs, and on production runs easily holds to 0.0001". Versatility comes from 20" table travel, three-wheelhead position, 90° workhead swivel for rotary surface grinding, and 150 to 450 rpm variable workhead speed.

New Bay State Wheel Severs Grinding Time for Iron Foundry

A new Bay State grinding wheel has cut in half the grinding time for semi-steel castings at a mid-western gray iron foundry. In a recent test this wheel removed nearly twice as much material as the next best wheel, lasted nearly twice as long, maintained a fast cutting rate and a low cost per pound of metal removed.

The special aluminum oxide wheel has a coarse grain, medium grade and a fairly open structure. The castings which were ground consisted of 38% steel scrap, 20% pig iron, 5% silvery pig iron and 37% scrap cast iron with a tensile strength of 40,000 PSI.

Pounds of metal removed per cubic inch of wheel used was 2.076.

Bay State Abrasive Products Company, Westboro 2, Mass.

European Machine Tool Exposition

The West German machine tool industry is holding the 1960 European Machine Tool Exhibition in Hannover, Germany, from September 11-20.

700 German and European machine manufacturers are scheduled to participate, with 13,000 tons of equipment displayed in nine exhibition halls.

Superior Hone Finishes Plant

Completion of construction of a new 15,000 square foot plant at Erwin, Tennessee, and the start of operations on the first production line, have been announced by Albert Hasty, president of Superior Hone Corporation.

Main offices, engineering and development work and facilities for special runs of honing machines will continue at the Elkhart, Indiana, company headquarters.

Bendix Buys Into Mexican Tool-and-Die Company

The Bendix Corporation has recently acquired a controlling interest in Disenadores y Constructores S. A. (Dicosa), one of Mexico's leading tool-and-die firms. The name of the company is being changed to Bendix de Mexico S. A.

In addition to maintaining its position in the tool-and-die field, Bendix expects to expand its product lines to serve the growing Mexican automotive manufacturing industry.

Black & Decker Opens San Diego Service Branch

John P. Spain, general manager, Product Service Division, The Black & Decker Mfg. Co., has announced the opening of a new factory service branch at 3811 El Cajon Boulevard, San Diego, California, to serve the rapidly-growing electric tool market in that area.

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Send today for complete details.

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Changing Faces . . .

Philip O. Geier, Jr., formerly manager of the Products Division, The Cincinnati Milling Machine Co., was recently elected a vice president of the company and appointed assistant general manager.

New Manager of the Products Division, following Mr. Geier, is **Maurice Gormly,** formerly director of the grinding wheel laboratory and manager of the grinding wheel plant.

The new president of The Heald Machine Company, Worcester, Mass., is **Lawrence H. Cousineau,** elected at a recent meeting of the board of directors. He succeeds **Carles F. Roby,** recently retired.

L. H. Cousineau

Martha A. Wilson

O. J. Bagnoli

Alexander John

In a series of management changes at Thomas C. Wilson, Inc., Long Island City, New York, **Mrs. Martha A. Wilson** moves from president to board chairman; **O. J. Bagnoli** steps up to president from vice president and general manager; and **Alexander John** succeeds him as vice president.

Mrs. Wilson became president of the firm in 1936, following the death of her husband, founder of the company.

Paul N. Stanton has been named vice president of marketing for Pratt & Whitney Company, Inc., West Hartford, Connecticut. He comes from Clearing Machine Corporation, Chicago.

At R-O Manufacturing Co., Madison Heights, Michigan, **Elwood Hemlin,** factory manager, has been elected vice president.

David E. Glass is now sales manager of the Machine Tool Division of The Producto Machine Company, Bridgeport, Connecticut.

Francis X. Buschman has joined Hitemp Wires, Inc., as director of development and engineering.

Philip O. Geier

M. W. Gormly

Paul N. Stanton

Elwood Hemlin

David E. Glass

F. Buschman

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FOR HOT and COLD SAWS
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SOLID or INSERTED TOOTH

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24" to 72" and Larger

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for PRECISION
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The highly polished alloy steel shanks have a Rockwell "C" hardness of over 60. This prevents damage which effects their being properly seated in the grinder.

Precision is assured by testing for accuracy by means of precision testing instruments. Extension on shank prevents damage when center is removed from the grinder.

Extra long, highest quality carbide insert enables the point to be reground an endless number of times. Precision point is lapped to a mirror smooth finish.

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Gisholt Machine Company, Madison, Wisconsin, has announced a number of executive changes.

George M. Class, vice president and director, will devote his efforts to customer relations, patent administration, and special projects. He has been with the company over 35 years.

Werner I. Senger, vice president, moves over from balancing to engineering.

John C. Weston succeeds **Woodbridge Bissell,** retiring after 30 years of service, as production manager.

Ralph J. Miller has been transferred to the Chicago office as district manager, while **Olaf M. Nysather** has been moved to Chicago as sales representative. **Woodrow A. LaVallee** of that office died recently in Acapulco, Mexico.

Frank J. Kenny, associated with The Lapointe Machine Tool Company, Hudson, Massachusetts, for the last four years, has been promoted to sales manager from assistant sales manager.

John C. Weston

Woodbridge Bissell

Ralph J. Miller

O. M. Nysather

The appointment of **Robert C. Dickey** as vice president and general manager of Coated Abrasives, Inc., was recently made known. The company, makers of abrasive specialty items, recently moved from Milwaukee to Detroit. Dickey remains on the staff of Michigan Abrasive Co., where he was formerly plant manager, as manufacturing process consultant.

R. C. Wigger, executive vice president, Ransohoff Company, Hamilton, Ohio, has announced the appointment of Earle C. Call & Associates as Ransohoff sales engineering representative in the San Francisco area.

The appointment of **Robert Wisser** as advertising manager of Wilkerson Corporation, Englewood, Colorado, was announced recently by **Harold Sampson,** president of Wilkerson.

At the Master Power Corporation, Bedford, Ohio, **Thomas J. Bennett** has been promoted to general sales manager. **Edgar D. McIntosh** succeeds him as central district manager.

George M. Class

Werner I. Senger

Frank J. Kenney

Robert C. Dickey

Earle C. Call

Robert Wisser

the FORM-ALL TWO ANGLE TANGENT TO RADIUS DRESSER

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- STRAIGHT LINE DRESSING

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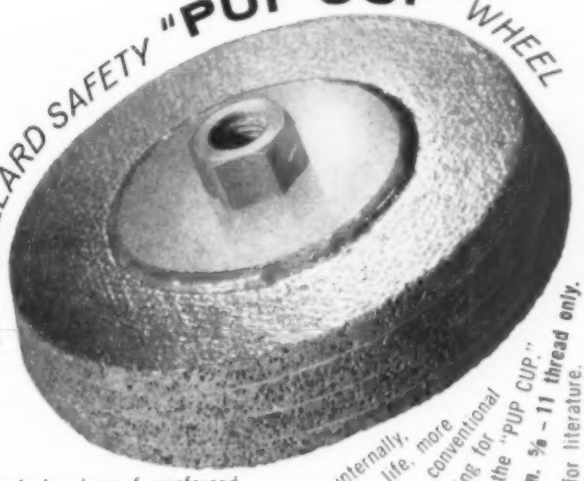
THE BULLARD SAFETY "PUP CUP"* WHEEL



The only break-proof reinforced cup wheel available with proven design and performance. Quadruple fibre glass reinforcement internally, externally which commands longer life, more usable abrasive . . . and it costs less than conventional cup wheels! For fast, safe snagging for all applications, specify the "PUP CUP". Size 6 5½ x 1¼ – 1½" rim. ⅝ – 11 thread only. Please write for literature.

⅝ – 11" nut

*Patent Pending

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Daniel B. Lamb has been selected to replace **Thomas R. Smith,** as Detroit division manager for Oakite Products, Inc. Smith is retiring after 19 years as head of the division.

Walter J. Bissinger has been named sales promotion engineer for gear tooth induction hardening equipment in the Gould and Eberhardt Division of Norton Company. He has been with G & E since 1939, joining Norton in 1959 when G & E was purchased by that company.

Newly-named supervisors are **Robert H. Gow,** industrial engineering, **Alan F. Howe,** process engineering, and **Marshall W. Greene,** manufacturing control, in the crushing plants; and **James E. Haggett** in the Industrial Engineering Department.

W. Bissinger

Alan F. Howe

Andrew B. Holmstrom, after 41 years of service, has retired as a vice president of Norton Company. He was elected a director of the company in 1940 and a vice president in 1944.

Other recent retirements at Norton are those of **Irving W. Stanton, Francis T. Luce, and** John **D. Laughrey.** These four had a service record of almost a century and a quarter.

William R. Moore, 69, former Norton Company vice president, has died in Clearwater, Florida, where he had lived since his retirement in 1956.

R. H. Gow

M. W. Greene

J. E. Haggett

A. Holmstrom

WILSON PORTABLE PNEUMATIC TOOLS

Lightweight • Powerful • Compact

All Wilson portable pneumatic production tools are designed for easy handling. These lightweight, compact tools are production time savers on a wide range of work. Catalog PT-58 gives all the facts. Write for your copy.

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BETTER TOOLS FOR BETTER WORK

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TURNABLE

the diamond tools with a **NEW TWIST!**

Cost No More—Last Longer!

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ORDER ONE TODAY!

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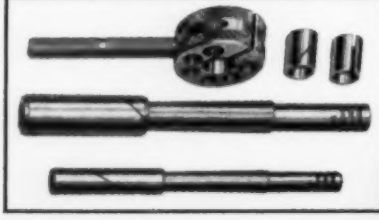

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Helical slot in lap gives faster lapping action and longer lap life—entire area in contact with work. Tapered arbor and I.D. of internal lap permit true expansion. External holder is retractable. Holes with or without interruptions lapped true to 1 millionth. *Catalog furnished upon request*

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Internal: 1/16" to 1-1/4" by 64ths, 1-5/16" to 3" by 16ths.

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20182 SHERWOOD • DETROIT 34, MICH.

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Charles N. Hall has been named chief grinding engineer for The Heald Machine Company, succeeding Clifford G. Menard, who becomes consulting engineer for the Engineering and Research Departments.

C. N. Hall

New assistant director, process development in Crucible Steel's Technology Department is **John G. Gill,** formerly vice president and director with Canadian Steel Improvements, Ltd., Toronto, Ontario.

The Black & Decker Mfg. Co. has announced the appointments of **George N. Anderson** as hardware sales representative, Chicago district, with headquarters in Minneapolis; **James A. Smith,** industrial-automotive sales representative, San Francisco; and of the following branch service managers; **James J. Prendergast,** San Diego; **George Rudat,** Chicago; and **Charles L. Perz,** Pittsburgh, replacing Rudat.

John G. Gill

Gordon W. Smithson, vice president of Potter & Johnston Company when it was integrated with Pratt & Whitney Company, Inc., in April, 1959, has been appointed chief engineer of the latter company. **Guy H. Drewry** continues as manager of engineering, responsible for administrative activities.

Wayne N. Vanderhoof is president of newly formed Interstate Abrasives, Inc., exclusive distributor in Chicago and adjacent areas for Peninsular grinding wheels.

W. N. Vanderhoof

John L. Ellis has been appointed vice president of Chromalloy Corporation and general manager of its Sintercast Division, Yonkers, N.Y.

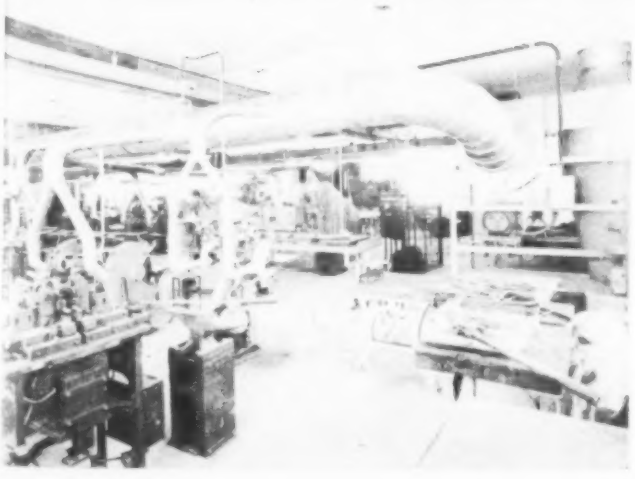
Recent graduates of the Allis-Chalmers training course for engineers have been assigned as follows:

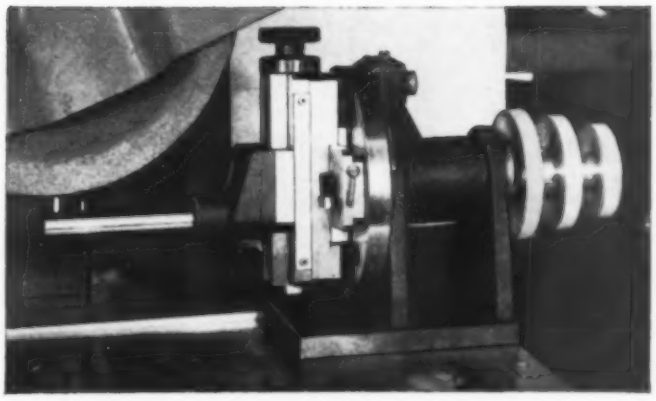
Kenneth F. Beckley, Jr. and **Curry A. Lindsey,** assistant foremen, material control, and **Thomas J. Kuczkowski,** foundry engineering staff, West Allis, Wisconsin, Works; and **Rudolph M. Maris,** materials management staff, Norwood, Ohio, Works.

John L. Ellis

Standard System Handles Dust Collection

An intricate dust collection problem has recently been solved through the use of a standard dust collecting system





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- completely self-contained
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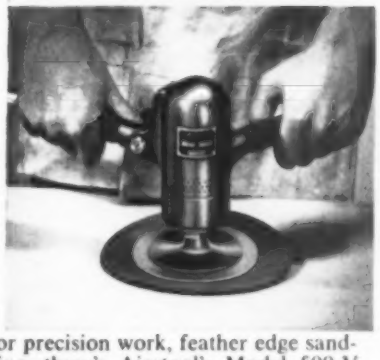
AIRETOOL GRINDERS AND SANDERS...

for high speed rough and finish grinding



Grind better and faster with job-proven pneumatic grinders by Airetool. For heavy duty work, nothing beats the new Airetool 700-V vertical grinder with revolving guard. Well balanced and easy to handle, it takes a 6" wheel or brush. And, for precision work, feather edge sanding and fine metal finishing, there's Airetool's Model 500-V lightweight vertical sander with flexible pad. Takes up to 7-inch discs with three distinct models operating at 2300, 3000 and 4000 rpm. For information on Airetool's complete line, write for Bulletin 67.

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30 years' experience in pneumatic tools

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"how to drill the new, extremely hard metals and metallic materials"

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New...

HOFFMAN
Diamond Impregnated METORAM CORE BITS

These are the new Diamond Core Bits that assure economical coring and finish grinding of the new, hard metals and metallic materials required by modern industry. Now, it is possible to core tungsten carbide, silicon carbide, beryllium oxide, titanium molybdenum, silicon crystals, germanium crystals, etc. . . . and at a fraction of the 'cost-per-hole' experienced with ordinary methods.

Hoffman Metoram Core Bits drill with such accuracy that secondary lapping or finishing is frequently eliminated . . . make new, cost-saving production techniques possible. Keeping pace with the advances of modern metallurgy, Hoffman Metoram Bits are available for O.D. or I.D. requirements. Standard outside diameter sizes from 3/16" to 1-1/2"; inside diameter sizes from 3/32" to 1-13/32".

Each Metoram Bit is designed for the specific metal to be cored. Customer samples are tested FREE in Hoffman Laboratories. Let Hoffman recommend the right bit for your metal coring job.

HOFFMAN BROS. DRILLING CO.

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shipped from the manufacturer's stock.

The Triple Cities Cutting Die Corporation, Rochester, New York, manufactures dies for the leather, plastics, and textile industries. All dies are ground free-hand, requiring a sizable number of shapes and sizes of grinding wheels. Such an operation requires a substantial dust collection system.

After a thorough competitive study, a standard system produced by the Aget Manufacturing Co., Adrian, Michigan, was selected for installation. Far from requiring a costly long tie-up of plant facilities, the installation was completed in two and one-half days by two inexperienced men, and at a cost definitely below preliminary estimates.

This newly-installed Dustkop system pulls 8800 cfm at a velocity of 4000 fpm, considerably in excess of state requirements.

Five Steps to Maximum Air Tool Production

1. An ample air supply must be delivered to the tool, 90 lb.-psig (pounds per square inch gage pressure) *at the tool* with sufficient volume in cfm (cubic feet per minute) for the particular size of tool being used. While the gage pressure at the compressor may show 90 lb. psig, tools located at some distance from the compressor will often show much lower pressures due to frictional loss, leaks and restrictive fittings.

2. Properly selected psig, grinding wheels and other accessories are essential. Your grinding wheel supplier can help you in the case of grinders, by determining the proper size, grit and angle of wheel for the material being removed.

3. Proper filtering of your compressed air and proper lubrication for the tool will assure maximum efficiency and greatly prolong the life of wearing parts.

4. Regular inspection for preventive maintenance will forestall premature failure of expensive parts. Bearings in grinders, for instance, are comparatively low in cost and if replaced prior to failure will prevent expensive repairs and help maintain tool efficiency.

5. Proper operating speeds are most essential on grinders to assure maximum metal removal and yet remain within safe operating speeds as established by the American Standards Association.

(Courtesy Master Power Corporation)

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Don't Miss these Features

GRINDING and FINISHING

CONTENTS FOR AUGUST 1960

22 New Techniques Keep Jets Flying

United Airlines utilizes new versatile machine for parts as large as 52" in diameter and 48" high.

26 Carbide Inserts Foster Unique Grinding Operations

Vascoloy-Ramet's close scrutiny of manufacturing results in excellent grinding applications.

28 Russian Research Super Finishing Copper Cylinders

Russian trade journal reveals interest and relative development.

30 Quality by Coated Finishing Crankshafts

Quality of bearing surfaces obtained through the use of coated abrasives.

37 Adjustable Center Reduces Setup Time

New adjustable center reduces setup by as much as 50%.

Coming Next Month

Show Issue

This issue will carry a complete show coverage of grinding and finishing equipment of the three shows which will be held in Chicago during September. Included will be descriptions and photos of machines and maps indicating location of booths where they are located.

Should You Use Manually Stroked Honing?

A complete evaluation of the application of hand or manually stroked machines for honing.

How to Grind Boride

Boron carbide is next to diamonds in hardness. For this reason grinding of this extremely hard material requires additional effort.

Rise and Fall Belt Grinder Automates Hand Operations

Forms and contours on small parts have been traditionally hand operations. New rise and fall grinder automates production, increasing uniformity and reducing scrap.

A GUARANTEE FOR YOUR CRYSTAL LAKE GRINDER

When purchasing a REX SUPERVAN HIGH SPEED STEEL SPINDLE for your Crystal Lake Grinder an additional $50.00 to the purchase price will give you a TWO YEAR SPINDLE GUARANTEE.

EASY OPERATION: CLOSE TOLERANCES:

ACCURACY: FINE MICROINCH SURFACE FINISH

A CRYSTAL LAKE GRINDER will hold size as well as grind round from .000005 to .000020" and finish from One to Four Microinch SURFACE FINISH. The essentials in grinding are a round spindle, taper bearings, a spindle that can be adjusted periodically without the squashing of bronze boxes and to have belt pressure ninety degrees from grinding pressure so the bronze boxes will not wear out of round.

For example, fuel injectors, after having been rough ground, can be ground to .000010" roundness with a sixty grit wheel and one pass of the wheel.

Write for literature

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CRYSTAL LAKE MACHINE WORKS, INC.

Since 1910

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Index to Advertisers

58 Aget Manufacturing Company
53 Airborne Instruments Laboratory
63 Airetool Manufacturing Company
62 American Lap Company
44 Atlantic Abrasive Corporation

12, 13 Bay State Abrasive Products Company
20 Behr-Manning Company
60 Benco Collet Manufacturing Company
22 Besly Welles Company
40 Blanchard Machine Company
6, 7 Bryant Chucking Grinder Company
61 Bullard, George H., Company, Inc.

23 Carborundum Company, Bonded Abrasives Division
55 Carroll Pressed Metal Corporation
10 Cincinnati Milling Machine Company, Cimcool Division
62 CITCO (Cleveland Industrial Tool Company)
5 Cortland Grinding Wheels Corporation
66 Crystal Lake Machine Works, Inc.

53 Desmond Stephan Manufacturing Company

55 Engis Equipment Company

61 Form-All Manufacturing Company
47 Fuller-Merriam Company

60 Hanchett Manufacturing Company
64 Hoffman Brothers

8, 9 Industrial Distributors, Ltd.

14, 15 Jones & Lamson Machine Company

24 Kuzmick, Paul L. Company

58 Lee, K. O. Company

Macklin Company—Second Cover
54 Metalloid Corporation
32, 33 Minnesota Mining & Manufacturing Company
49 Murray-Way Corporation

17 Norton Company (Grains)
2, 3 Norton Company (Machine Tool Division)

42 Olson Filtration Engineers

25 Pekay Abrasives Company
Peninsular Grinding Wheels Sales Corporation Third Cover

59 Rampe Manufacturing Company

59 Sopko, William & Sons, Inc.
51 Sundstrand Machine Tool Company, American Broach Division
50 Sundstrand Machine Tool Company, Sundstrand-Arter Grinding Division

68 Taft-Peirce Company
63 Threadwell Tap and Die Company
56 Timesaver Sanders
43 Torit Manufacturing Company

4 United States Diamond Wheel Company
56 United States Electrical Tool Company
18 United States Rubber Company

54 Walls Sales Corporation
Wheel Trueing Tool Company—Fourth Cover
52 White and Bagley Company
48 Willey's Carbide Tool Company
62 Wilson, Thomas C. Inc.

A Final Thought

The Vital 10 Per Cent

Says an executive of a metal company, ". . . the population growth of our country is such that a company has to do 10% better than last year just to stand still."

What are the implications behind this statement? If a company proudly announces that its business volume is 5% ahead of last year, it is actually down 5% from what it ought to be. No cause for cheers here.

Should a business feel complacent, thinking its volume is the same as last year, it will be horrified to learn (and certainly will not believe) that it has lost 10% of its business to someone else.

Pity the poor organization which is down 5% or 10% from last year; it's whirling downhill at the rate of 15% or 20% and will land with a nasty 'kerplunk' in the red ink. For no matter how much business is lost or gained, no matter what sales volumes are or what production output is . . . costs keep going up. And if some doubters don't believe this executive let them bear in mind that costs certainly have gone up 10% and are continuing to rise. So, just to keep even with costs, business must be 10% ahead of last year.

The reasoning behind the original statement is sound. With a growing population the needs of the people increase. Your own imagination can supply a long list of needs triggered by the increase in population.

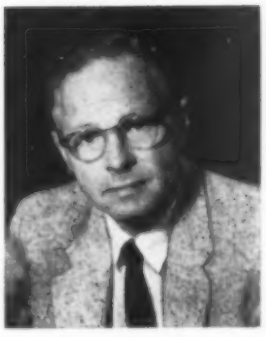
What does all this mean to business? To an industry, such as grinding? To us, in our special sphere of operation?

To business it means additional sales efforts either through an expanded force or a realignment of territory. It means additional appropriations for merchandising, sales promotion, advertising, marketing.

To an industry it means further efforts in technical research so that the products of the industry may be used better, may perform better, and last longer.

To you and to me it means a second and third look at the way we are performing certain operations. Have we improved them in the past few years? With the development of machines, wheels, coolants, accessories, can we take advantage of them to increase the output of our particular department? Have we objectively analyzed our situation with a view toward improvement.

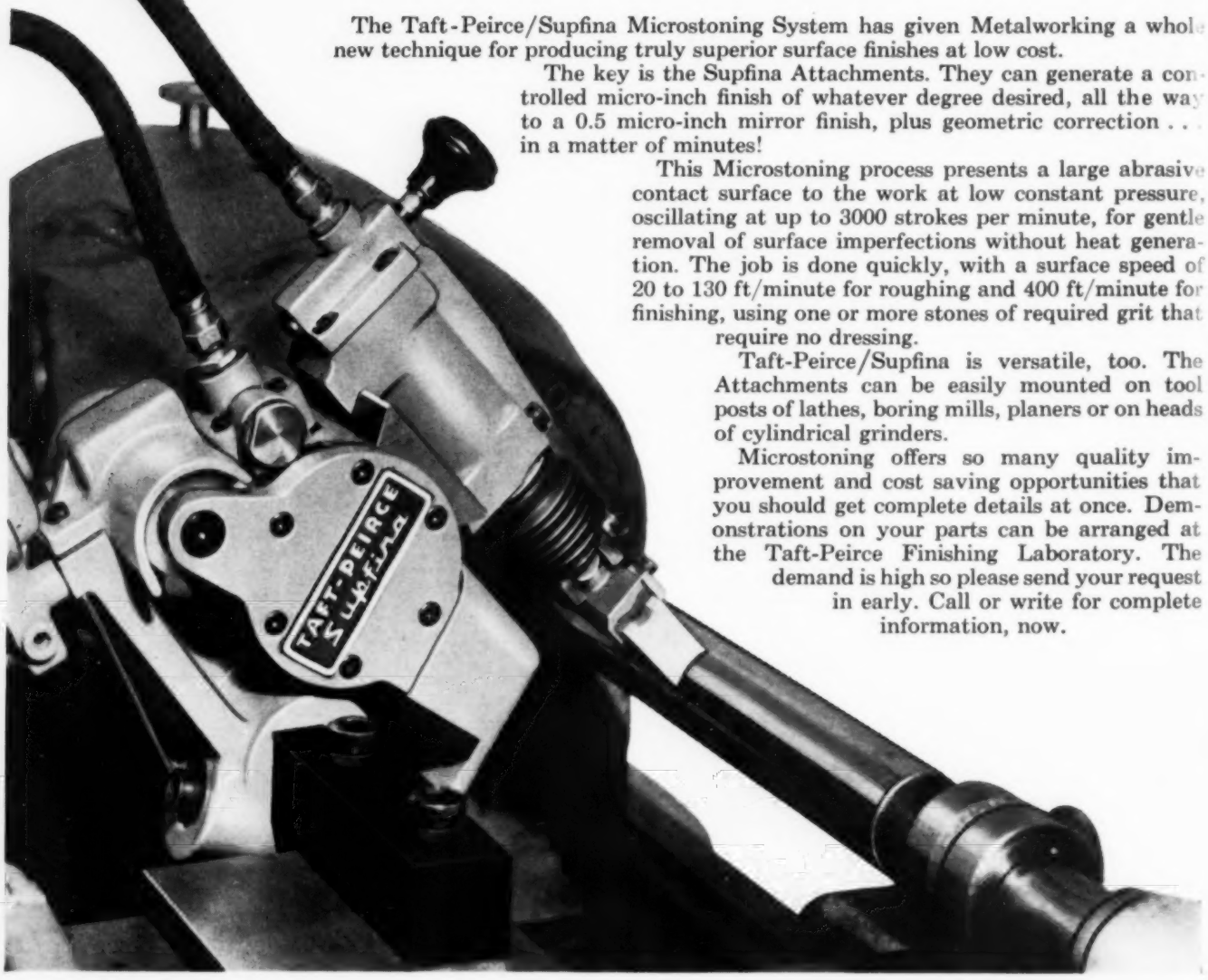
To up a company's business 10% over last year to stay even, and then up it an additional 10% to stay in the lead takes the combined efforts of every member of a company from the president on down. For, don't forget, next year another 10% will be added, and then another, and another. And suddenly, before we're out of bed, we have three more competitors fighting for what should have been our business from the outset.



Wm. F. Schleicher

Vice President & Editorial Director

NOW! Microstoning Provides Controlled/Micro-Inch Surface Finishing In Minutes!



The Taft-Peirce/Supfina Microstoning System has given Metalworking a whole new technique for producing truly superior surface finishes at low cost.

The key is the Supfina Attachments. They can generate a controlled micro-inch finish of whatever degree desired, all the way to a 0.5 micro-inch mirror finish, plus geometric correction . . . in a matter of minutes!

This Microstoning process presents a large abrasive contact surface to the work at low constant pressure, oscillating at up to 3000 strokes per minute, for gentle removal of surface imperfections without heat generation. The job is done quickly, with a surface speed of 20 to 130 ft/minute for roughing and 400 ft/minute for finishing, using one or more stones of required grit that require no dressing.

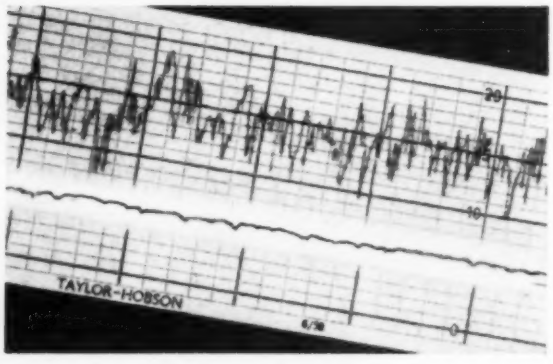
Taft-Peirce/Supfina is versatile, too. The Attachments can be easily mounted on tool posts of lathes, boring mills, planers or on heads of cylindrical grinders.

Microstoning offers so many quality improvement and cost saving opportunities that you should get complete details at once. Demonstrations on your parts can be arranged at the Taft-Peirce Finishing Laboratory. The demand is high so please send your request in early. Call or write for complete information, now.

MICROSTONING MEETS SPECIFIED MICRO-INCH FINISH IN ONE PASS

The part being microstoned above, averaged 16 micro-inch finish as ground, was microstoned in one pass to a specified 7 micro-inch finish in 30 seconds. A single 500 grit microstone on a Taft-Peirce/Supfina Microstoning Attachment did the job.

This Talysurf chart shows surface finish of a guide pin before and after Microstoning. The "before" ground surface reading (above) of 20 micro-inches was changed to a surface reading of 1.5 micro-inches by Microstoning for only one minute! (Chart courtesy of Engis Equipment Co.)



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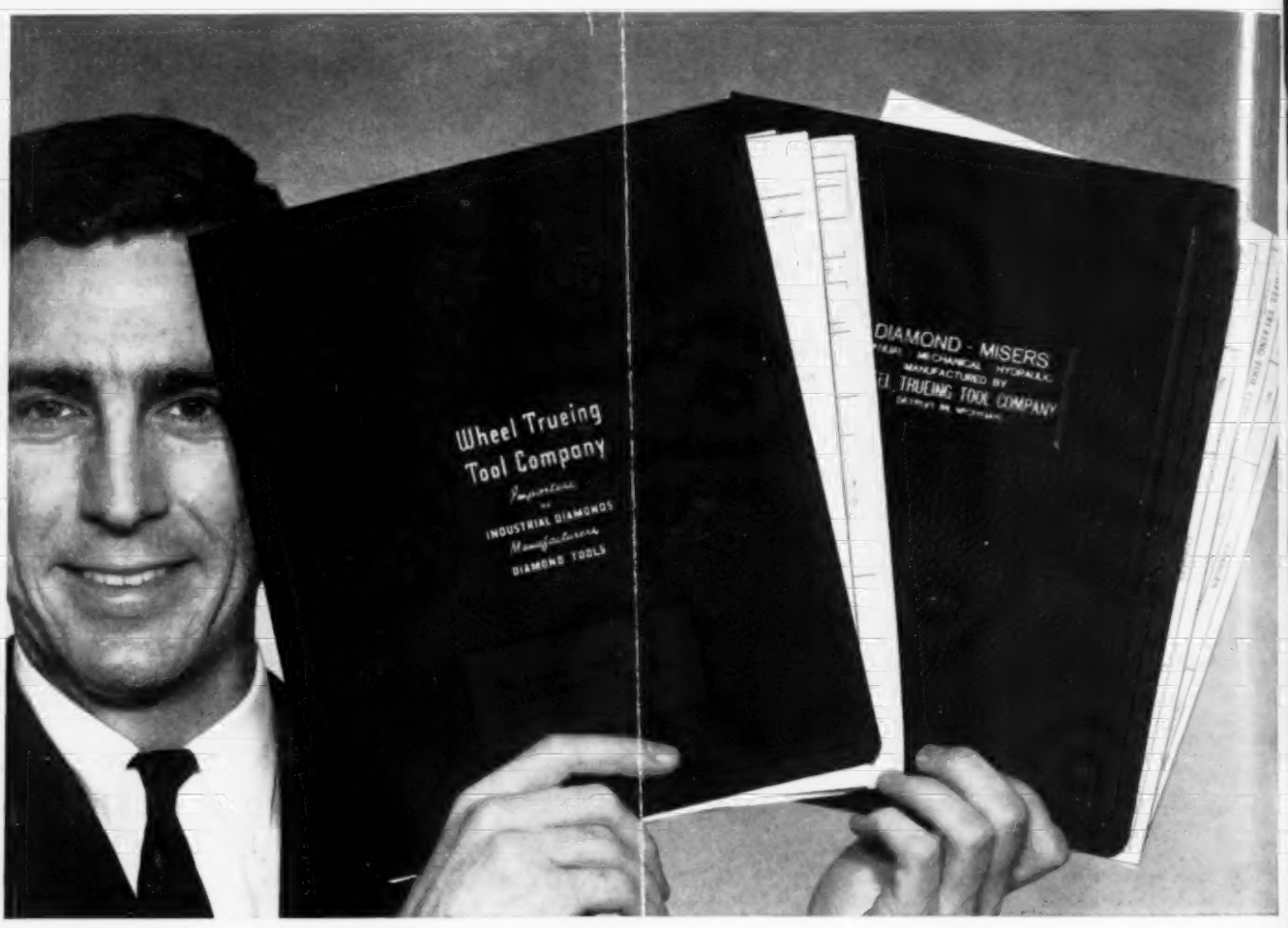

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